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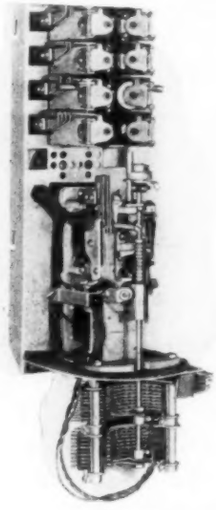
TELEPHONE ENGINEER

VOLUME XXVI OCTOBER, 1922 Number 10

STANDARD IN DESIGN FLEXIBLE IN APPLICATION

Strowger Automatic equipment presents a combination of advantages found in no other type of central office telephone apparatus. Its design is sufficiently standard to permit it to be maintained at very small expense and to be operated in harmony with equipment installed years ago. It is flexible enough to meet adequately and economically every service need in telephone exchanges of every size.



The dial-equipped telephone is the up-to-date telephone. The needs of telephony in every part of the world will eventually be covered by the inevitable dial.

Automatic Electric Company

FACTORY AND GENERAL OFFICES, CHICAGO, ILL.

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Cleveland, 415 Cuyahoga Bldg.
Philadelphia, The Bourse Bldg.
Columbus, 516 Ferris Bldg.
New York City, 21 East 40th St.
Rochester, 612 Mercantile Bldg.
Boston, 445 Tremont Bldg.
Pittsburgh, 608 Fulton Bldg.
Detroit, 526 Ford Bldg.
Washington, 905 Munsey Bldg.
Cincinnati, Union Central Bldg.
Los Angeles, San Fernando Bldg.

ASSOCIATED COMPANIES:

INTERNATIONAL TELEPHONE SALES AND ENGINEERING CORPORATION, New York
International Automatic Telephone Company, Ltd., London
Compagnie Francaise pour l'Exploitation des Procédès Thomson-Houston, Paris
Automatic Telephone Mfg. Co., Ltd., Liverpool
Automatic Telephones, Australasia, Ltd., Sydney

THIMBLEYE
PATD
DROP FORGED
The THIMBLEYE not only saves time, trouble and cost of extra thimble but also eliminates any possible injury to guy wire. Another exclusive feature of
NEVER-CREEP ANCHORS

Cross section view showing method of installing the NEVER-CREEP ANCHOR. It cannot creep as it pulls directly against solid, undisturbed earth. All disturbed and moisture affected earth is in back of the NEVER-CREEP Anchor.

THE most essential feature of any practical anchor is an exclusive feature of the NEVER-CREEP Anchor — direct resistance against solid, undisturbed earth. As the illustration above plainly shows, only the guy rod passes through the earth that must bear the resistance.

Not only is the NEVER-CREEP Anchor designed so as to offer the greatest possible resistance but the material from which it is made has more than enough strength to withstand the most excessive strains. They answer the purpose fully, in many instances where other types of anchors would fail to hold.

Their installation is accomplished quickly; simply bore a hole with an ordinary earth auger —drive in the guy rod—hang on the anchor plate, and the job is done.

Write for Data and Prices

The CHANCE COMPANY

See our exhibit at the convention

CENTRALIA, MO.

Booth No. 4 Crystal Room

GENERAL OFFICES:
28 E. JACKSON BLVD.
CHICAGO, ILL.
Tel. Harrison 4000

TELEPHONE ENGINEER

EASTERN OFFICES:
56 W. 45TH ST.
NEW YORK
Tel. Vanderbilt 3695

VOL. XXVI OCTOBER, 1922 NUMBER 10

Plant-Radio-Bell Relations

These Three Subjects in Spotlight at Convention of Independents at Hotel Sherman, Chicago, October 24-27—Expect to Set Record in Value and Attendance

Chicago, Ill.—Telephone magnates who weigh the good hard cash and precious time of themselves and employees against convention attractions, see in the coming national convention of the United States Independent Telephone Assn., at Hotel Sherman, Chicago, October 24-27, practical value that justifies a forecast of a record attendance.

Three of the announced headliners on the program indicate, in a general way, the diversified interest of the big meeting.

A Practical Program

The matter of Bell-Independent relations, which is being ironed out so both factions will be aligned for the common profit, is to come in for considerable development. There has been time enough to make nationally, an intimate study of the effect of the historical Hall memorandum from the Independent point of view. Independent and Bell teamwork in various state associations has been productive of many benefits to both sides and consideration undoubtedly will be given to this co-operation on a national scale. The Independents insist upon protection of their manufacturing interests in whatever arrangement may be made with the Bell for united effort in national association work. Toll relations also are expected to figure as a prominent factor in the Bell-Independent confab. So much for one part of the convention program which is of importance principally to the executive element.

The part that radio is to play in the telephone industry, as it now functions, also is to get a spotlight position on the program. Radio, from the standpoint of the management and the practical telephone man is to be given the third degree. There has been enough work with radio done by men in the telephone industry to give the industry a fairly good knowledge of where radio fits in with the business of wired communication.

The possibility of telephone companies going into the merchandising of radio equipment, because of the public regard of telephone companies as experts on all phases of telephony, holds forth the promise of an added profit that is going to draw some interesting comment. Whether the radio is to be a competitor of wired telephony, or an adjunct as is now commonly believed, will be discussed by telephone men who have made an intensive study of radio since it has figured so prominently in national life.

Plant problems are to have treatment from scores of acknowledged authorities. Every phase of work that is to be done to the extent of many millions of dollars is to be put on a clinical stage. It is the attention that is to be devoted to this chapter in telephone work that has influenced many telephone chiefs to make reservations for responsible members of their constructing and operating forces.

The bare outline of the program makes it a 100 to 1 shot that the telephone man who can't get enough from the forthcoming convention will have to come to Chicago suffering from an aggravated case of sleeping sickness.

Exhibits to be Educating

Advance reports from the exhibitors who will be represented at the Sherman show that much effort has been given to planning exhibits that will go further than just the glad-handing, as pleasant as it is bound to be. Thirty-five exhibits will be made at the convention by manufacturers and engineering companies that are making thoroughly studied displays to promote more efficient utilization of their products and services.

Something of the character of these exhibits may be seen by the following brief notices sent to Telephone Engineer by the exhibitors:

The American Appraisal Co. intends having on exhibit a number of sample volumes, showing the manner in which its public utility appraisals are prepared with the specific nature of the reports, the material included in them, the basic data used in determining unit costs and from these specific values, the manner in which its values are segregated in accordance with uniform systems of account, the detail into which its investigations go, and other matters of interest to anyone who is concerned in an accurate valuation for rate making, financial, or other purposes.

This company also will have a number of sample drawings, blueprints, photostats, and so forth, typical of the plans and drawings which accompany its public utility appraisal reports. It also will have a number of charts showing typical fluctuations in values during recent years, the analysis of total costs or values into the various component elements, and so forth. Possibly, however, the most important feature of the exhibit will be the attendance of Mr. H. M. Engh, the manager of the American Appraisal Co.'s public utility department during the course of the convention. Mr. Engh will be able to explain the exhibit to anyone who is interested and, through his many years of experience in the appraisal of public utilities, will be glad to answer any questions on this important and much-discussed subject.

The Monarch Telephone Manufacturing Co., will be well represented at the National convention, occupying the large space opposite the entrance to the Convention Hall.

A complete line of magneto and common battery telephones, in various types, as furnished by the Monarch company, is to be displayed on panels and connected so that various tests can be made with them. Two of the switchboards to be displayed are to be used as part of their exhibit by courtesy of the customers who have previously contracted for them. The No. 43-D 320 line board has been purchased by the Greenwood, Ark., Telephone Co., and the No. 41-C 120 line board was contracted for by the Interstate Telephone Co. of Dyersville, Iowa, for its Epworth exchange.

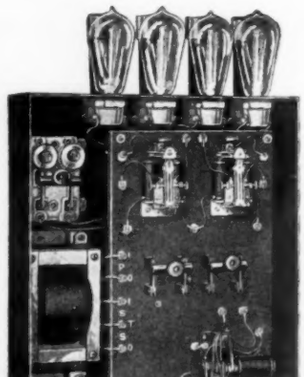
Their new No. 21 telephone receiver is to make its appearance for the first time. Those who have examined it, pronounce it a great improvement. The newly-designed Monarch No. 13 operators' receiver also is to be shown. It weighs less than five ounces.

The Monarch Company's exhibit is to be in charge of sales representatives C. W. Snyder, H. C. Shear, C. W. Lemont and W. J. Stanton. Others of the Monarch organization to attend the convention are Geo. O. Wilson, sales engineer; Ray C. Ridpath, supply sales department; P. L. Picot, advertising department; R. O. Palmer, sales manager; A. W. Steinke, superintendent and engineer, and L. Q. Trumbull, general manager.

Paul W. Herbst, the Chicago tool distributor, will exhibit a full line of hand tools used by telephone, telegraph, central and power stations. This exhibit will include Kleins' electricians' and linemen's tools, Barthel gasoline and kerosene torches and firepots, Rimco insulated pliers and screw drivers, Gem wire and cable grips, cable tools; leather goods, such as linemen's belts, safety straps, tool bags, kits etc.; construction tools.

Some of the most advanced ideas in quick reference will be displayed by the Acme Card System Co., which will show a rapid sight method of card filing which is in use by representative telephone companies, among them the Kansas City Telephone Co.

Exchange and subscribers' equipment, showing the advancement of the independent manufacturers' art, will be displayed and demonstrated by American Electric Co., Automatic Electric Co., Kellogg Switchboard & Supply Co., Leich Electric Co., Monarch Telephone Mfg. Co., North Electric Mfg. Co., and Stromberg-Carlson Tel. Mfg. Co. Other exhibitors who will make displays and demonstrations that warrant the attention of telephone men are: Holtzer-Cabot Electric Co., Cook Electric Co., Naugle Pole & Tie Co., L. T. Block & Co., National Carbon Co., Reliable Electric Co., French Battery & Carbon Co., Page & Hill Co., Standard Underground Cable Co., Coffey System & Audit Co., Runzel-Lenz Electric Mfg. Co., Electric Storage Battery Co., Chance Co., Templeton, Kenly Co., McLeod Electric Supply Co., Bowdle Acct. System, Bell Lumber Co., Turner Brass Works and the Harrah Mfg. Co.



Ringing and Charging Machine to be Shown at Leich Exhibit

The North Electric Mfg. Co. is planning to exhibit a working model of an Automanual exchange with an Automanual operator, and also a working model of an All Relay Dial Controlled Exchange. The All Relay Exchange will be an innovation in the telephone art of this country, being the first of its kind to be exhibited at a national convention, although North has a number of them in successful operation both in this country and abroad.

Every need of the subscriber for telephone service will be illustrated and demonstrated in a way possibly more complete than ever before at the Kellogg exhibit in the west room at the Hotel Sherman, during the National Convention the week of October 24. This statement not only refers to service of the small country town, but of the metropolis. The Kellogg original service switchboard will be demonstrated in unit type sections fully equipped and more completely than ever shown at any previous convention. In addition, there will be a very complete line of telephone apparatus, private branch exchange equipment, magneto wall and floor boards, some Kellogg radio parts, and a complete line of supplies. As many as possible of the Kellogg sales force who can be spared from their territories will be present at this meeting to welcome old friends and new.

French Battery & Carbon Co.'s exhibit at the National Convention will make it a point to tell visitors of the protective coating that is claimed by those responsible for the formula to be one of the biggest developments in battery construction. Shelf life loss is said to be reduced to a minimum. There also will be on display French Ignition and Radio B. Batteries. Frank Eldredge and his teammates will do their usual nifty meeting job.

Runzel-Lenz Electric Mfg. Co. will exhibit, in Room 111, Switchboard and Operators' Cords, Receiver and Desk-set Cords, Transmitter Cords, Radio and Wireless Receiver Cords, Interior Telephone Wire and other R-L products.

Chance Co. expects to book considerable business at its showing of "Never Creep" Anchors. This anchor with its thimbleye feature seems due for a good hand from construction men. Chance's "Skyrocket" Lightning Arresters and Terminal Brackets and "400 Companion" Lightning Arrester also will be shown.

Electric Storage Battery Co. will exhibit its standard Storage Batttery Cells used in telephone service and some accessories. The exhibit also will present various types of batteries used in radio work.

The Stromberg-Carlson Company will exhibit a representative line of its apparatus, including such well known products as the Super-Service Switchboard, the No. 101 P. B. X. Switchboard, the No. 102 P. B. X. Switchboard, the No. 104 P. B. X. Switchboard, the No. 105 Magneto Switchboard, the No. 896 Magneto Telephone, the No. 986 Central Energy Desk Stand, the No. 890 Mine-A-Phone, Inter-Comm-Phones, Duratex Cords, line materials and construction materials. This apparatus will be exhibited in the Grey Room, Hotel Sherman, and will be attended by officers and salesmen of the Company. Cards will be on hand, which customers and friends of the Stromberg-Carlson Telephone Mfg. Company are invited to fill out for a souvenir miniature desk stand.

In the Leich Electric Co.'s exhibit much interest is expected for the steel cased type of combined ringing and charging machine code No. 121 which provides a complete power plant for

magneto exchanges. This particular type has duplicate rectifiers which may be operated independently or together and provides a reserve rectifier to be used in emergency cases. Another Leich exhibit will be a demonstrating set which clearly shows the exceptional features of their magneto multiple switchboard. It will be demonstrated that a call may be answered easily from any position regardless of the position in which the call originated and that, at the instant the plug is inserted in the pack the line signal is released to normal. It will be further shown how the busy signal is obtained in associated multiple when one of the lines is in use. The speed and efficiency of the magneto multiple, Leich says, proves that it is not necessary to convert to an expensive common battery telephone system to get good telephone service in a medium sized exchange. The Automaphone expects to show just how such a telephone may be used to advantage on their local systems. Nearly every magneto plant can use a number to their own pecuniary advantage as the Automaphone service is recognized by State Utilities Commissions as worth 25c per month increased rental, is the Leich statement.

The Radio fans will be given an opportunity to examine the Non Tune Rectifier for charging A. batteries. The vibrating units of this machine are similar to the ones used on the 121 combined ringing and charging machines are those of the Railway signal rectifiers. The vibrating units are shaft mounted and do not have a tuned frequency such as a spring mounted armature of a harmonic ringer. In this way troubles due to variation in frequency and voltage of power circuit are overcome. The vibrator units are now equipped with relay lock which positively locks the vibrating unit in a neutral position and prevents discharge of battery current when power current is interrupted. This lock is essential to satisfactory home charging. The Leich original single pole headphone will be demonstrated. The fact that the magnets, spool, and diaphragms are assembled as a unit and then incased in a light weight pressed aluminum case is proof, Leich claims, that this phone would not be sensitive to temperature variation like those with magnets mounted direct in the case. The case, provided with bakelite cap, also is a protection against injury when the headphones are accidentally let fall on hard surfaces. Actual reception from several broadcasting stations gave proof of the clear quality of the Leich phones. There will be many other pieces of equipment of their standard line of telephones and ringing machines and their specialties Radd spark plugs and Magnetic timers.

Those in attendance will be O. M. Leich, Secy. & Gen. Mgr., A. C. Reid, Chief Engineer, A. J. Kohn, Sales Manager, B. L. Parker, Advertising Dept., T. J. Gullion, John A. Campbell and W. C. Drysdale, Salesmen.

At the convention the Harrah Mfg. Co. will demonstrate the Handyman Guy Stretcher and Pole Pusher. In addition to this Harrah will have a new fifty-pound jack for pulling poles straight out of the ground for four feet without stopping.

Steel Case a New Feature of Columbia Hot-Shot Battery

Cleveland, O.—The National Carbon Company's most popular type Columbia Hot-Shot Battery, namely, the No. 1461—a four-cell power, 6-volt battery—which up to the present time has been sold in a fiber container, is now being put on the market in a new steel container. Important advantages claimed by the manufacturers for the new Steel Case Columbia include the following: Constructed to withstand the roughest service; unaffected by exposure to the elements; thorough insulation; full service and life assured through the protection of the battery by the steel case; a new woven fabric handle for comfort, strength and convenience. This new steel container is beautifully lithographed in colors. The materials used in lithographing the container also serve as an electrical insulation for the outer surface. The price of the new battery is to be exactly the same to both the trade and user as the old fiber contained battery. The other standard types of Columbia Hot-Shot Batteries are to be put into steel containers and announced as fast as practicable.

Thimbleye of Chance's Never-Creep Anchor

VETS TO FROLIC

Independent Pioneers Plan Great Party at Chicago

Chicago, Ill.—The entertainment committee of the Independent Pioneer Telephone Association, consisting of W. S. Vivian, chairman; H. D. Currier, E. C. Blomeyer, C. W Wilkins, C. S. Schafer, J. F. Jaap, F. L. Eldridge, G. W. Rodormer and E. I. Pratt, held its first meeting at the Hotel Sherman, Friday, September 8.

Mr. Vivian outlined the suggestions of the executive committee and general plans for the second annual luncheon to be held at 1 o'clock, Thursday, October 26, were completed. The committee is making an effort to have this second annual gathering of the Pioneers surpass last year's assembly, not only in the point of attendance, but in varied interest.

The luncheon will be served in the Tiger Room, with provisions made for a big crowd. All speech making will be done away with this year. The committee is arranging a snappy program of the very best talent available.

Further details will be decided upon in the near future and announcements will be made from time to time regarding this luncheon. It is planned to have at least two "super features" that will be surprises.

It goes without saying that everybody is going to attend the United States Independent Telephone convention at the Hotel Sherman, says the committee, and it is equally true that all are going to set aside the price of a ticket, (or two if the "Mrs." is going), for this Pioneer luncheon.

FARE AND A HALF

Reduced Rates to Telephone Convention at Chicago, October 24-27

Chicago, Ill.—A fare for the round trip of one-and-one-half of the regular one-way rate has been authorized by all the passenger associations except the Southeastern. These rates are to be handled on the certificate plan. The passenger buys a full-fare ticket on his going trip and obtains from the railroad ticket agent a certificate stating the fact that he has purchased such a ticket. In order for anyone to obtain advantage of the reduced rates, it is necessary that 250 certificates be deposited with the secretary of this association, therefore it is essential that everyone buying a ticket to Chicago to attend the convention should obtain a certificate or receipt from his local ticket agent.

Hoosiers Hold Meet

Indianapolis, Ind. — The Annual Convention of the Indiana Telephone Association was held at the Claypool Hotel here, September 20 and 21. The convention was opened by the address of President Henry A. Barnhart who gave an interesting review of general conditions and outlined some of the expectations of the future. Following the reports of the Secretary and Treasurer and appointment of Committees, the convention listened to addresses by Frank L. Beam, of Mount Vernon, O., and H. O. Leinhard, assistant to the Vice-President, in charge of Personnel Relations of the A. T. and T. Co.

In the afternoon of the first day Theodore Weinshank, a mechanical engineer of Indianapolis, who has recently returned from an extensive trip in Russia told of the conditions which he found there. He was followed by John C. Mellett, Executive Secretary of the Public Utilities Assn. who spoke of the work of the association for the benefit of Indiana Utilities.

The Thursday morning program consisted of an address by F. B. MacKinnon, President of the United States Independent Telephone Assn. and a paper by Prof. R. V. Achatz of Purdue University. Mr. MacKinnon pointed out two of the most important of the present day telephone problems, the first in adjusting relations so that failure to ask for adequate rates by less progressive companies would not affect the public relations of their better managed neighbors and the second, in developing an experienced personnel to operate and maintain the independent properties in the future. Professor Achatz' paper dealt with the possibilities of interconnection of wire lines and radio circuits. He also discussed the possibility of a "wired wireless" broadcasting service over lines of telephone companies.

Underground Discussed

A round table discussion of the subject of underground construction occupied the greater part of the afternoon. The discussion was lead by F. O. Cuppy of Lafayette, Secretary of the association, who described the practice of the Lafayette Telephone Co. in laying a certain amount of conduit each year so that the plant would ultimately be almost entirely underground. If subsoil conditions were favorable he advocated the laying of vitrified tile without concrete. S. M. Isom of Mitchell presented a paper on the subject of laying cable without conduit and gave figures that he had compiled from data supplied by companies in 28 states. A method of using a protective compound on cable laid directly in trench was also described. A. J. Frazee of Connersville gave his conclusions that the type of construction adopted must be suited to the plant. He favored conduit construction in main streets and used buried cable in outlying districts. F. A. Montrose, of the Indiana Bell Telephone Company, Indianapolis, pointed out that pole construction was needed in many cases for distribution and suggested that joint pole agreements with other utilities might in many cases provide a more economical type of construction than underground.

The convention closed with election of directors. All the retiring directors were re-elected except John I. Cheney of Winchester, who was succeeded by C. H. Rottger of Indianapolis. The Directors will meet in the near future to elect officers for the coming year.

Other papers were read for the practical benefit of the convention attendants by C. A. Spaulding on "The Value of a Commercial Survey"; E. M. Prisk, on "Satisfied Patrons"; "Creating Better Public Relations," by J. J. Walsh, Buffalo division superintendent of traffic for the New York Telephone Co.

F. B. MacKinnon, president of the National Independent Association, was a guest of honor and addressed the meeting on "Men and Money." Another notable who addressed the convention was Frank L. Beam of Mt. Vernon, Ohio.

Mrs. E. E. Lewis of Cuba, N. Y., had one of the features of the convention in her address, "An Unusual Case of Service Station Management."

"Relations With Connecting Companies" by J. A. Healy of Buffalo, H. E. Bradley's remarks on traffic, H. P. McDonough's paper on "Plant Accounting," and pioneer reminiscences of T. T. Ramsdell of Buffalo and P. O. Jacobs of Erie, Pa., also were headliners on the program.

An interesting and comprehensive program was conducted by W. S. Vivian in his operators' school.

ON THE JOB "UP STATE"

New Yorkers in District Meet Discuss Practical Problems—Operators Schooled

Jamestown, N. Y.—One of the upstate telephone associations of New York's typically brisk district meetings was opened here by a lively and friendly discussion on municipal ownership between Mayor Samuel A. Carlson of Jamestown and President Fuller of the Association. His Honor expressed the kindliest sentiments toward his local telephone utility, but said he was in favor of municipal ownership of some utilities and even a few commodities. He thought the highly technical nature of the telephone business should keep it without the realm of municipal ownership. Mr. Fuller, referring to the mayor's fourteen year tenure of office, suggested that one of the reasons for this lasting popularity was the executive's reluctance to participate in attacks on a striving and capable telephone company.

Interesting and valuable addresses were made by W. S. Vivian on phases of the operators' work and relations with the company; by E. R. Stonaker of Saranac Lake on "Measuring the Traffic Job," and "What the Association is Doing," by J. G. Ihmsen, General Manager of the organization.

PIONEERS' NINTH MEET

Two Thousand Bell Old-Timers Plan, Reminisce and Frolic at Cleveland

Cleveland, Ohio — Two thousand telephone men, whose careers in the industry date back to its infancy, staged the most successful meeting of the Telephone Pioneers of America here.

The Ninth Annual Convention of this association brought together men and women who have attained their majorities in business life devoted solely to the telephone industry.

General J. J. Carty, vice-president of the American Telephone & Telegraph Co., and head of its research laboratories, presided at the sessions as president of the Pioneers. His presidental address was devoted principally to eulogizing Dr. Alexander Graham Bell.

Long distance telephone demonstration, having Havana, New York and San Francisco as the three points in its triangular compass, was one of the features of the meeting. Many cities cut in and answered roll call.

Diversified entertainment features occupied the time of the Pioneers when the business sessions had been completed.

Leonard H. Kinnard, president of the Bell Telephone Co. of Pa., was elected the new president of the Pioneers.

Prepare for Fight With Sleet

Arch-Enemies of Jack Frost Tell of Plans They Use in Battling Winter Storms—"Ounce of Prevention" Is Prescribed by Experts in Waging Winter Line War

Quite a few years ago, an old-timer who was superintendent of a telephone company in one of the states of the middle west kept a fatherly eye on a certain member of the staff of this paper while the latter was just a kid who drove a yellow broncho about over a considerable portion of three counties keeping the trouble out of the farmers' telephones. One of the principles that he taught by word and example was that "the best time to clear trouble is before it comes in". Into one of the discussions that come up around the editorial rooms was brought the matter of sleet storm damage and this member of the staff suggested the applicability of the old principle. Out of the discussion grew the idea that we might find out if the principle was being applied and to what extent it would operate to reduce the damage that occurs annually to many of the telephone companies in the northern part of the country.

Following the suggestion it seemed that the best way would be to get the ideas of the men who are in the front line of defense when the sleet king begins his attack. A few representative companies in the sleet belt were selected and letters were written asking the opinions of the management as to the possibility of preparing in advance for sleet and also as to the best line of action when the storm strikes. We have received several good letters and they cover the ground so thoroughly that we are presenting them for the benefit of our readers. The ideas and suggestions are worthy of careful consideration by all companies in the sleet areas.

P. M. Ferguson, Manager of the Mankato, Minn., Citizens Telephone Co., says:

"Aside from having a large reel of duplex wire on hand at all times, the only preparedness that we make for coming of sleet storms is to build our leads in the exposed country districts where the attack is greater in the best manner we know how, using twenty-foot poles with six and seven-inch tops, and storm guyed every eighth or tenth pole, as the case may be, paying particular attention to our corners, seeing that they are substantially built. When we can not side guy we place an "A" fixture. Of course, where we cross a highway or on corners where overhead guys are required, we must of necessity use a higher pole which is a twenty-five-foot pole with a good seven-inch top; that is practically the only preparation we make for sleet storms.

"We have found that the weather reports are very reliable in our part of the country. As we do not cover a large enough territory, we do not distribute any materials, as we can reach any point on our lines from Mankato even in bad weather within an hour.

"We certainly believe in periodical overhauling of our pole lines, and rather than set in a new pole here and there, if the pole line is one of the old type, using twenty-five or thirty foot poles, the better way is to cut five or six feet off of them and drop them down, making a low lead which escapes a good deal of the wind, which really causes the damage after the sleet has collected on the wires. No doubt, an occasional new pole here and there does help, but when all the strain of a lead is put upon one or two new poles, we have found that they did not hold and could not have been expected to.

"We have one particular exposed portion on the prairie, northeast of town, where we have put in these low poles, I have mentioned, and have done everything to eliminate sleet trouble. We have had no broken poles of late, but we have had many wires broken, and we are seriously considering the installation of a piece of underground cable thru this exposed portion, burying it in the ground along the right of way. The latter is the only real way of getting away from sleet storms, and I predicted that not very far in the future, every telephone company serving rural subscribers will be using this method."

E. D. Glandon, Pike County Telephone Co., Pittsfield, Ill., writes:

"With reference to the sleet problem, I said to my directors 'that in my judgment the expense from that source would be cut in half within a period of five years.' I have in mind that where our lines were reconstructed they would be built of 20 foot poles instead of 25 and with heavier corner poles and heavier guying and with storm guying every one-half mile or mile as the exposure justified.

"The nature of the guying is largely determined by the location of the poles and the nature of the surroundings, sometimes in a straight lead we double arm and guy four ways, sometimes we do not head guy, but put a push guy and anchor both on the same side of the pole which protects against a side wind from either direction. In past years our loss from sleet has been very heavy, but with the shorter poles set about 40 to 44 to the mile for one and two cross arm leads we expect to be able to master the situation so that no sleet storms will keep us out of service very long. We do not set aside any special reserve for this purpose, altho in past years we would have been entirely justified. The best preparations for sleet storms is a well anchored short stubby pole line. The weather report is of some value in that it gives us time to organize our force at distant points before our lines go out. We try to keep our material distributed so that in case of storm and bad roads we will not be tied up for lack of them."

F. H. Remkel, Portage Telephone Co., Portage, Wis., tells us:

"While the subject of sleet storms is not very dear to the hearts of telephone men, it is, during the open season, very near to them.

"A number of years ago I ran some ads soliciting patronage. One of these ads said something about "There is much comfort in knowing that you are prepared for anything which may occur." I remember one of our ministers took this as his Sunday morning text and he told me afterwards that it was one of the best sermons he had ever preached.

"It occurs to me that many of us in the utility field might preach to our

patrons, not one, but many sermons on this text, and by practising what we preach, we would find ourselves in a better state of preparedness than is often the case. We would be better prepared by having at least enough material and supplies to render first aid to the crippled plant, better prepared by having set up an adequate reserve for depreciation, as well as a reserve for extraordinary contingencies. This reserve should be in liquid assets, and should be built up from year to year until it equals from five to twenty per cent of the depreciable plant, its percentage varying in proportion to the amount of underground and cable plant not subject to storm damage.

"My experience has taught me that the best way of determining the amount and location of trouble after a sleet storm is to drive over all the main leads and toll lines, checking the number of poles and wires down in each bad break, so that the crews starting out on the repair work know exactly how many poles will have to be set in order to get service restored by temporary construction. I have found that in most cases the poles are broken off three to seven feet above the ground, so that a new pole or part of the old pole can be fastened to the stub. This class of construction will generally hold up until weather conditions permit building new leads.

"We frequently cut in long spans of twisted pair drop wire, supporting it in the trees or on the fences, in order to restore service as promptly as possible.

"I am a firm believer in periodic inspection. By this I mean inspecting poles which have been set six or eight years, testing their strength at least every two years and replacing every pole which does not come up to the required strength. I have found that an experienced lineman with a pike pole will determine the actual strength of poles up to thirty feet long more accurately than by digging the dirt away from the butt, shaving off the dead wood and measuring the circumference of the apparently solid wood remaining.

"These periodic inspections and replacement of weak poles and guys left our plant in such condition that we were enabled to restore service to every patron within ten days after the sleet storm of February, 1922, including our rural lines extending six to fourteen miles from the exchange. Our local exchange service was restored within four days. Neighboring exchanges in the same sleet belt were months in restoring service, and several cities had no service for several weeks.

"I also believe in head guying or side guying or placing two pole fixtures at least every mile, and if the lead is a heavy one, the distance for this guying should not exceed one-half mile.

"In regard to amortizing sleet losses, I believe it will be necessary for several companies in this section to spread their losses over the next ten to fifteen years. The proper way to care for such losses is to anticipate them and spread them over the preceding years by building up adequate reserves to take care of extraordinary contingencies. This additional percentage of the depreciable plant is as legitimate a cost as the annual pay roll or tax accrual and should be provided for in the rate structure. This method safeguards the public's interest even more than it does the stockholder's, and when understood by the public, it will never be protested.

"Volumes may be written on this subject and be the subject of much debate. However, the companies following the fundamentals outlined above have during the past years found themselves in enviable positions and have both satisfied and contented, as well as permanent and profitable patrons."

"Cable Trouble"
The Weather
a Telephone Enemy
KANSAS CITY TELEPHONE COMPANY
We will do our part to make Kansas City
a good place to live in.

How Kansas City Interests Public in Its Troubles

Texas District Holds Round-Up at Waco

Waco, Tex.—One of the Texas Independent Telephone Association's usual lively district affairs was held at Waco, Sept. 20th, and a representative attendance of telephone men active in the Waco sector was benefited by practical talks on a diversity of well chosen subjects.

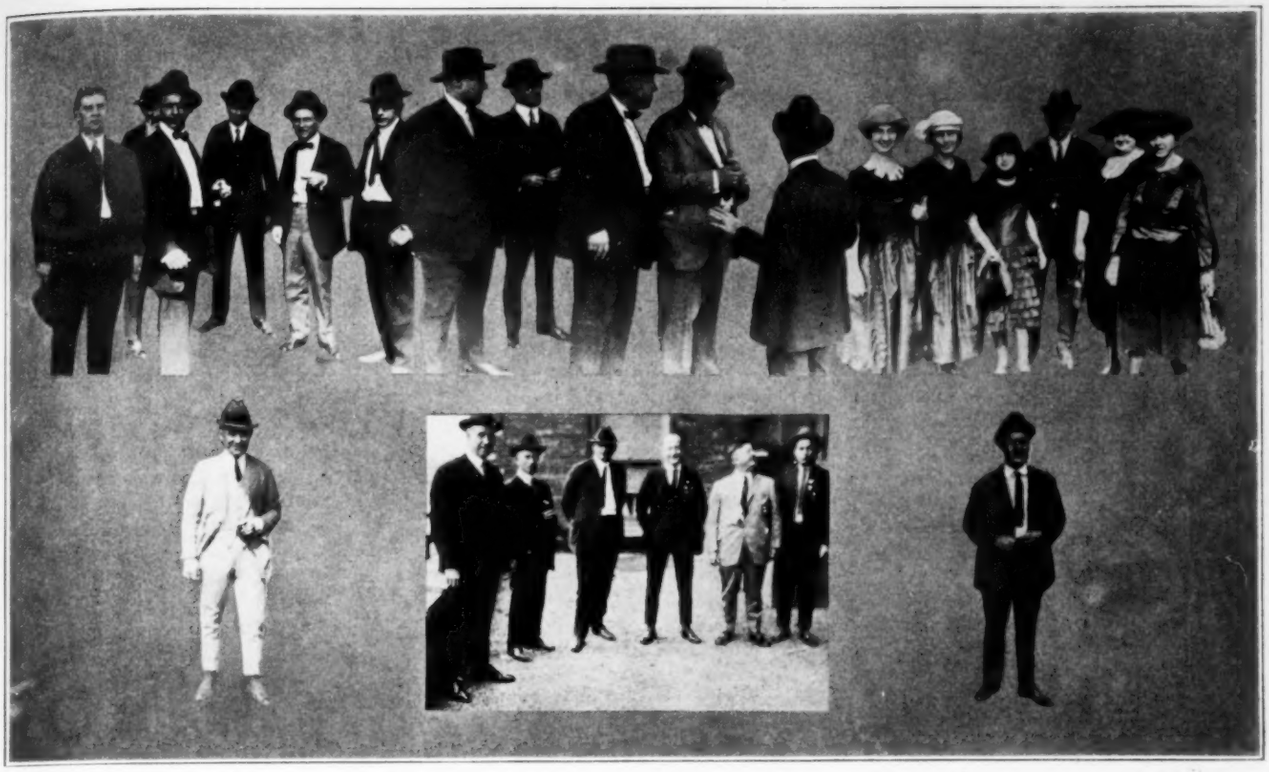
Among the speakers were: R. B. Still, President of the Association, Tyler, who talked on legislative matters; George McQuaid, Director, Texas Public Service Information Bureau, who explained the work of the newly organized bureau and what it expects to do; Oscar Burton, Assistant General Manager, Gulf States Telephone Company, Tyler, who addressed the session on "Exchange Construction and Maintenance," and J. C. Paxton, Assistant General Manager, Grayson Telephone Company, Sherman, with an illustrated talk on "Increasing Net Earnings." G. B. Foscue, Jr., Assistant to Vice-President and General Manager Texas Telephone Company, Waco, who has had considerable experience in rate matters, equalization boards and public relations, talked on these subjects. "Toll Service and Transmission" was the subject of an instructive talk by Sam H. Shutt, General Superintendent, Texas Long Distance Telephone Company, Waco. D. H. Walters, Manager, Texas Telephone Company, McGregor, told how he manages his exchange, keeps his collections up and keeps his subscribers satisfied. Traffic matters were ably handled by E. R. Evans, Traffic Superintendent, Texas Telephone Company, Waco. Sam Dibble, Equipment Engineer, Texas Telephone Company, Waco, told how to locate and clear switchboard troubles.

Ohio University Issues Bulletin on Telephone Service

Columbus, O.—Circular No. 9 of the Engineering Experiment Station of the Ohio State University is devoted to a brief and interesting treatise on "Telephone Service; The Obligation of the Telephone Company to the Telephone Subscriber." In it, C. A. Wright, professor of electrical engineering outlines the elements of telephone service to which the subscriber is entitled in return for "adequate telephone rates."

Quarter Million Southern Bell Construction at Orlando, Fla.

Orlando, Fla.—Within the next two or three years the Southern Bell Telephone Co. is to spend $250,000 in the Orlando section.



Dr. Gordon, Jay Mitchell, et al, Discuss the Destinies of the Illinois Telephone Men, at Peoria

Plan to Teach Tomorrow's Men

Illinois Meeting Promotes Idea of University Course for Telephone Executives of Future—The Meeting and Exhibits Have a National Aspect

Peoria, Ill.—For the first time a state convention of self-made telephone men has listened to an outline of the plan for charting the seething seas of telephony so executives of the future would have smoother sailing.

Dean C. M. Thompson of the University of Illinois College of Commerce spurred the idea of a special Illinois university course for young men training for executive positions in the telephone industry, by telling the Illinois state convention of the development of commercial education and its specific application to the telephone business. This push given the proposal made by Jay Mitchell, A. R. Bone, E. S. Sterrett, and E. D. Glandon at an earlier conference of educators and public utility executives, was one of the several important developments of the well attended state affair.

Another one of the features of the convention was the adoption of a resolution to be submitted by the Illinois representatives at the forthcoming national convention of the U. S. Independent Telephone Association. In addition to proposing a method of electing the directorate of the national association so that all state associations would be assured representation, the Illinois resolution called for dropping the bars against Bell participation in the national body. This resolution went through without the pitched battle expected by some. Independents and Bell men both comprise the membership of the Illinois organization.

Frank Smith as Mr. Gloom

Frank L. Smith, Chairman of the Illinois Commerce Commission, sent shivers along the spines of the worthies assembled by sketchily presenting what he frequently referred to as his "humble opinion." The development days are over, said Mr. Smith, and practices applicable to the stage of saturation now should prevail. Briefly, he forecast rate cuts as being in line with prevailing conditions. He cited one instance where lower rates meant more business and a greater profit to the utility. He held it as fundamental that the permanent prosperity of utility must be based on constantly decreasing rates.

There still are "public be damned" utility executives, Mr. Smith commented, who forget "in the larger sense, operators of public utilities neither own, or manage for their special advantage, the properties under their control. They are merely trustees; title holders for the public."

Three hundred telephone men and women were in attendance at Peoria when the convention's business got started following the deftly phrased welcome of Mike Finn, the local Chamber of Commerce's able gladhander, to whom, in his official and personal capacity, the thanks of the association was expressed by Dr. J. G. Schwartz.

Dr. Gordon Held at Helm

The annual presidential address of Dr. R. E. Gordon summarized the work of his administration and expressed some hopes for the future that evidently looked good to the convention, for the Doctor and his entire administration were re-elected at a later session. Jay Mitchell's successful régimé as the association's

top-sergeant also was reflected in annual secretary-treasurer's report, which showed the substantial condition of the association's affairs.

Max Hosea of the Indiana association, commandeered from a comfortable parking space in the convention hall, cut loose with a few suggestions that could be taken back to the home folks with profit by many of those present. Speaking about reserves, Hosea suggested that telephone companies letter on their windows, and have on their stationery and other printed matter, the amount of their reserve. This idea, adapted from the banking field, would give telephone subscribers an idea of the solidity and permanence of the company that was serving it, so Hosea said.

Cheadle on Rate Making

C. B. Cheadle of Joliet, the association's general counsel, after reporting on his activities in the association's behalf, spoke on "Fundamentals in Rate Making."

He outlined these fundamentals as:

"Under the common law the Utility Company has the right to fix rates. Unless changed by statute the common law continues in force. There is nothing in the statute that changes this rule. The statute is declaratory of the common law. The only restriction the common law placed upon the right of the utility to fix rates was that they be just and reasonable and not unjustly discriminatory. This rule has not been changed by the statute. The statute assumes that all rates shall be made in the first instance by the company. The power of the commission to fix rates begins when it appears that the common law rule has been violated. The function of the commission is similar to that of peace officers whose duty it is to see that the laws governing members of society are not violated.

"The company has the right to earn all it can under just and reasonable rates. This was the rule at common law and must continue to be the rule unless changed by statute, either expressly or by necessary implication. Nothing in the statute can be found that changes this rule. The law does not limit earnings, or deal with earnings, but only with rates. The only control the law assumes over rates is that they be just and reasonable and not unjustly discriminatory. The law does not limit earnings that may be made under just and reasonable rates. A company is entitled to earn all that it can under such rates. Misunderstanding of this fundamental law is responsible for most of the trouble in rate making. Good law is simply good sense, and if one company by diligence and economy can make more under just and reasonable rates than another company under like circumstances it is as much entitled to the reward of thrift as an individual engaged in any other business. A utility must make money in order to obtain money with which to maintain and extend its business. A person should pay fair rates for telephone service as well as for dry goods, groceries, and other commodities. A utility must pay fair and reasonable rates for the use of money necessary to equip and carry on its business. While laws are powerful, they cannot fix rates for money. What is a fair return on money is a question that cannot be answered by statute. Every utility company would like to obtain money at the lowest rates possible in order that its rates for service might be reduced.

"Just and reasonable rates should produce something more than a mere fair return upon the investment. As to what constitutes reasonable rates—that is a question of common sense rather than arithmetic. It is a fundamental principle in all trade that both parties must receive a benefit. Telephone service is worth more than it costs to produce. Otherwise, it could not be sold. No company could long continue to furnish service at less than cost and no company could sell service at cost or more than cost unless it was of value to the subscriber greater than the cost of producing it. The difference between the cost of producing service, including a fair return upon the investment and the value of the service to the user, represents a profit or "spread" to be enjoyed by one or both parties to the transaction. The fundamental factors in determining what are just and reasonable rates are

"(a) Cost of producing the service.
"(b) Value of the service to the consumer.
"(c) An equitable division of the 'spread.'

"A reasonable rate is one that equitably divides the spread between the company furnishing the service and its subscribers. The value of telephone service varies among the different subscribers. The practice among companies has been to give the most, if not all, of the spread where any existed, to the subscriber, retaining but a small portion for itself. This policy is wise if not carried to an extreme because of the large number of subscribers that are thus attracted to its service. The average telephone company has a bargain counter day every day in the year at which its goods are sold at cost or less than cost. It is not the province of the commission to regulate profits but to see that the rates are just and reasonable and not unjustly discriminatory.

"The relations between the company and its patrons should be such as to furnish the maximum of service to the subscriber and secure the maximum number of subscribers to the service at just and reasonable rates. The company must honestly earn all the money that it seeks to obtain. The earning of this money involves three fundamental things:

"(a) Furnishing efficient service.
"(b) Furnishing as large a service as shall be reasonably possible.
"(c) Courtesy at all times to the users of the service.

"The furnishing of good service involves these three things:

"(a) The building of good plants.
"(b) Maintaining the plants to a maximum of efficiency.
"(c) The employment of competent help.

"To these three may be added that of co-operation between the company and its patrons.

"The value of the service is determined by:

"(a) Its importance to the user.
"(b) Its efficiency.
"(c) Its certainty.
"(d) Its extent."

Interesting slants on public complaints were presented by J. Howard Matthews, Service Engineer for the Illinois Commerce Commission, a young engineer who is in high standing with Illinois telephone companies because of his ability and helpful attitude, particularly in inductive interference matters.

"Looking Forward," by A. R. Bone, General Commercial Superintendent for the Illinois Bell, was a well-received address which is printed in part elsewhere in this issue of Telephone Engineer.

Toll Problems Discussed

An open forum on toll matters brought forth papers and discussion of great practical value. The subjects covered were: "Toll Revenues in the Small Exchange," in which J. C. Poole, General Manager of the Lincoln Telephone Co., gave some valuable tips. "Free Service vs. Tolls," an able comparison by R. P. Dexter, General Manager at Galva, and "Construction of Short Haul Toll Plant." In the latter address F. A. Norris, General Manager of Monmouth, told of many constructions that his experience and observation had established as good practice.

In Dean Thompson's address,

"University Preparation for Public Utility Careers," he told of the beginning of the University of Illinois' College of Commerce with a few students, and its growth until, at the present time, there are approximately 2,100 on its roster.

Charles Deering, Secretary of the U. S. Independent Telephone Assn., spoke briefly on some tangible values of association membership and extended a cordial invitation to attend the national event at Chicago.

An address by Hon. F. J. Stransky of Savanna and one on "The Culture of Enthusiasm, a Shot in the Arm," by Olin Caward, closed the business sessions of the convention with suggestions, both inferred and specifically expressed, that the lessons of a highly successful and practical meeting be put into service back on the job.

Wood Preserving Paper Long-Bell Help to Illinois Convention

Peoria, Ill.—An interesting and brief treatise on wood preservation in relation to the telephone industry, written by C. C. Fritz of the Long-Bell Lumber Co., of Kansas City, Mo., was very much in evidence at the Illinois convention. Copies of the pamphlet may be obtained free on request, from the Long-Bell advertising department.

Crowd is Crossed at Pioneer Illinois Luncheon

Peoria, Ill.—Jay Mitchell's formal entry into the select circle of the Independent Telephone Pioneers of America provided the big laugh of the Pioneer luncheon given at the Illinois convention.

With Coffey, Hoag and Johnston as the death watch, a figure clad in white, a la Ku Klux Klan, and blindfolded, was escorted to the seat facing the speakers' table.

Mitchell's qualifications as a candidate were discussed pro and con, especially con. Sordid details of his adventurous career were revealed, but were offset by the tributes of other speakers.

While Mrs. Mitchell trembled awaiting the judgment, and the shrouded figure in white illy concealed his nervousness, the candidate was divested of his costume and stood revealed as black as his character had been painted. It developed that Jay, because of the pressure of other engagements, had prevailed upon a colored bell-boy to play his part.

The banquet hall of the hotel was packed to the walls by the crowd which heartily enjoyed the Pioneer affair.

Peoria, Ill.—There is a new kind of a debutante these days—not one of the "slinkers" with the latest in long and clinging garments and a two volume compilation of social engagements, but a keen eyed kid who stages a 'coming out" party that really means something in the community's affairs.

She is the maiden who is reading her first paper at the operators' schools which have been conducted with so much profit to the industry by W. S. Vivian of the Automatic Electric Co.

If you don't think that is some affair in the fair young thing's life, you won't establish much of a reputation as a guesser. One of the big features of the Illinois convention were the operators' sessions which introduced several new stars to the telephonic constellation.

In these operators' conventions you see women who have risen to the economic demands of their families by making a real business of their telephone employment, you see enthusiastic girls whose studious efforts are significant of the new place of women in business, and you begin to realize that in the telephone industry the gentler sex comes into its own in commercial life.

Snappy Show at Peoria

Peoria, Ill.—According to the high-pressure boys sent by the leading makers of telephone equipment and supplies to cover the Illinois convention, the order book has resumed its high standing among works of literature.

The Illinois convention began a buying drive that is expected to be in full effect at the time of the National affair at Chicago. President Gordon started the welcome affair a few minutes after reveille the first day by giving the delighted Mr. Kohn of Leich an opportunity to fill up page one of his sales book.

Exhibits at Peoria were of a character to get action, no matter what kind of a "stall" the prospective prey might offer in defense.

A brief description of the exhibits follows:

McLEOD ELECTRIC SUPPLY CO.—Bronze drop wire took the spotlight along with the Atlas torch. C. G. McLeod related many tales of the strength of the bronze wire, and its immunity to corrosion, and offered a volume of evidence in support of his claims. Cable hangers, cross arms, insulators, and other supplies also were shown at the McLeod exhibit.

BOWDLE ACCOUNTING SYSTEM—Forms demonstrating the advantages of this method of telephone company accounting were displayed and the system explained by F. A. Bowdle. Centralized accounting also was featured at the Bowdle exhibit.

NATIONAL CARBON CO.—Cooper W. Wilkins and his battery mates, R. R. Brooks, P. L. Becker, J. E. Ripple and W. H. Bentley sung the virtues of Columbia telephone batteries, accompanied by a customers' chorus. The exhibit was handsomely decorated with Columbia advertising matter, and batteries for telephone and radio work were displayed. A post-Volstead bar featured cider and doughnuts.

LEICH ELECTRIC CO.—W. H. Drysdale and A. J. Kohn conducted convincing demonstrations of Leich equipment and introduced to the assembled multitude the Leich rectifier for charging radio batteries.

CARBON PRODUCTS CO.—G. W. Wheatley kept at the job, just as though the Carbon Products' fire was a minor event. As a matter of fact, the recent blaze at Lancaster destroyed only one of the company's two separate plants, and full warehouse stocks will keep "business as usual" until the completion of the new factory in November.

PAGE & HILL—Here was a one-room school in pole preservation. Samples of treated and untreated poles, details of the P and H treatment, and other tangibly presented lights on pole preservation made the exhibit one of great practical value. Pole business, said S. G. Harris, who was in charge, showed promising signs of great activity in the coming year.

COFFEY SYSTEM—Jack Coffey, the figure specialist, again presented details of his popular accounting system as the means of bringing the management a quick, complete, and accurate record of its financial status.

RELIABLE ELECTRIC CO.—George Rodormer had the line laid out for the benefit of those who were anxious to know what's what in cable terminals, sleeve connectors, and other items that have made the Reliable stand ace-high. He booked business enough to make his Peoria jaunt a profitable affair.

AUTOMATIC ELECTRIC CO.—Automatic's hallway movies stopped the passing crowds. Slides showing Automatic installations were projected on the wall of the hall by a machine located in the Automatic room. Due to faulty ventilation, the Automatic installation was transferred from the room in which it was originally placed. The whole job was completed, and working, less than a half hour after the decision to move was made. A youth named Everson was the Automatic installer responsible. Radio supplied world's series scores. Automatic had a bevy of its sales stars on the spot—W. S. Vivian, F. J. Truby, R. H. Burfeind and H. E. Clapham promoting the propaganda of the "Dial of Destiny."

KELLOGG SWITCHBOARD & SUPPLY CO.—A display and demonstration of Kellogg equipment was staged under the able supervision of G. L. Banks, H. W. Hogue, J. W. Baylock, W. S. Fisher and L. F. Kline. Kellogg had a big layout and a bunch of customers present ready to give a helping hand when confirmation of "Use is the Test" was needed.

NORTH ELECTRIC MFG. CO.—Remote control, a feature of the North line, which enables the operator at a central station to care for several distant stations, was demonstrated by J. A. Harrison, Wm. Nichols, and Miss Gladys Sonntag at the desk. Harrison related some interesting stories of the service of the equipment, among them that of the Celina installation, where one centrally located operator handles the traffic for Celina and four outlying exchanges. Other North Automanual and automatic equipment was shown.

FRENCH BATTERY & CARBON CO.—Frank Eldredge, with Frank Foster, and the Peoria representative, Otto Graening, did the honors. Among the interesting features of the French exhibit was a special patented protective coating for telephone batteries which reduce battery loss from shelf life to a minimum. The radio French battery — Ray-O-Vac — with unique construction that prevents breaking down of cells, short circuiting and noisiness, also was favorably received. Both of these batteries got a good hand and several fine orders sweetened the showing.

ILLINOIS ELECTRIC CO.—J. B. (the initials don't stand for John Barleycorn) Haley, Tom Endsley, Pat McGivern, Stuart Walters and Ed Sorrel demonstrated radio, sold telephone and radio equipment and, in general, conducted themselves in a way which made even more brilliant their reputation in the industry.

AMERICAN ELECTRIC CO.—Headed by W. T. Curtis, the staff of the American company and its representatives, the United States Electrical Supply Co., displayed American's 50-line board, completely equipped with late features, the X69 wall phone, hand microphones for magneto and common battery, Dialaphones, the Bruns bracket and American's radio equipment.

LYNTON T. BLOCK CO.—Features of the utilities indemnity exchange were told by W. S. Ferguson and W. D. Jackson. Many of the Illinois companies already are availing themselves of the service, so the Block room was picked as a parking space for the elect. Growth of the Block proposition continues steadily, said Mr. Ferguson.

STROMBERG-CARLSON TELEPHONE MFG. CO.—One of Stromberg-Carlson's usual extensive and informing exhibits, with the Super-Service switchboard coming in for the big play, was presented by P. D. Meyers, B. F. Baker, J. R. Thompson and C. W. Watson. The operators clustered around the Super-Service board gave the exhibit a fashion show aspect.

MONARCH TELEPHONE MFG. CO.—H. C. Shear and George O. Wilson featured a small demonstrating switchboard, a combination and convertible common battery and magneto layout that hit the fancy of its viewers. The Monarch line of common battery and magneto equipment, construction material and supplies was attractively displayed.

COOK ELECTRIC CO.—John Jaap and E. S. Shields conducted an impromptu school of cable distribution. The Cook exhibit consisted of main distributing frames, pole cable terminals, sub-station protectors and electric soldering irons.

J. K. JOHNSTON—The well-known Indiana engineer held open-house where clients and prospective clients gathered and discussed rate affairs.

EUGENE STACY — The Stacy load binder was exhibited and details of its field of work in the telephone industry were presented. In addition to binding loads of poles securely on the wagons, the Stacy device is being successfully used for stringing wires and in other construction activities.

Syracuse, N. Y., District Meet to Have Novel Show

Syracuse, N. Y.—In order to carry out the extensive and interesting program that has been planned for the Syracuse District Meeting, it is necessary to change the dates to October 17 and 18, instead of 18 and 19. By making this change, the entertainment committee will be given possession of a large banquet hall at the Onondaga Hotel, the day before the convention, for the purpose of erecting and installing the equipment that will be required to produce the most interesting and practical demonstration that has ever been presented in this section of the state. This production takes the form of a telephone drama with real live actors and actresses; shows a Common Battery Multiple Switchboard in full operation; the movements of the telephone operator in making connections, and movements that take place at the subscriber's station when calls are being placed or received. It requires the installation of storage batteries and several truck loads of scenery to carry out this part of the program, and in addition to this wonderful attraction, a highly instructive industrial film will be screened, which will be followed by an amusing comedy feature, entitled "Number Please," by Harold Lloyd.

Utility Advertising Men Form National Association

Chicago, Ill.—With a nucleus of street railway advertising men, a Public Utility section of the Associated Advertising Clubs of the World was formed at the American Electric Railway convention. B. J. Mullaney, of the Illinois Committee on Public Utility Information, was the moving spirit of the organization. All public utility advertising men are eligible for membership.

Pennsy Bell Seeks Permit to Buy P. and A.

Pittsburgh, Pa.—Authority to buy the Pittsburgh and Allegheny Telephone Co., has been requested of the Interstate Commerce Commission by the Bell Telephone Co., of Pennsylvania. The Bell offers $2,500,000 for the property. Since 1918, the P. and A. has been unable to earn its bonded indebtedness of $70,000 on its first mortgage 5s. On June 1, 1922, the bond interest was defaulted and it was announced that when it was paid, accumulated interest at the rate of 6 per cent would be added to it. It is understood that the Bell Company will assume both the principal and interest on the bonds as a condition of the sale. On December 31, 1921, the actual assets of the company came to $7,203,671, while the net assets were valued at about $4,500,000, while the current assets and liabilities were just about equal. The Bell Company also asked for authority to buy the Chartiers Telephone Company of Washington for $100,000.

Nebraska Groups in Profitable District Meetings

Lincoln, Neb.—Under the leaderhsip of President Bruce Brown of the state association, three district meetings of the organization recently have been held at Franklin, Cambridge and Curtis. Radio received a good play at the Franklin meeting. Subjects discussed at the sessions included, "Inter-company and Public Relations," E. K. Haldeman; "Accounting Methods," G. W. Worley; "Construction Methods," K. T. Hindricks; "Organization," W. F. McCulla; "Radio," B. J. Peterson, and "Connecting Company Relations," M. J. Saunders.

W. F. Brown Heads Colorado Public Service Assn.

Denver, Colo.—W. F. Brown, Traffic Manager of the Mountain States Telephone & Telegraph Co., was elected president of the Colorado Public Service Assn. at its nineteenth annual convention, held at Glenwood Springs.

Missouri Meeting, November 15-16, at Jefferson City

Jefferson City, Mo.—R. W. Hedrick, secretary of the Missouri Telephone Assn., has announced the annual meeting, to be held at Jefferson City, November 15 and 16.

New Orleans is gabbiest of American cities, according to recently compiled figures, which establish 11 calls per phone as the daily average of the southern metropolis.

Radio's Work With the Wire

A Survey of Prospective Development Necessary to Join Radio and Wire Telephone Service for Extensive Practical Utilization—Present Status

By R. V. Achatz

That the radio telephone will not supplant the wire lines is the opinion generally held by those who have made a study of the two systems of communication by voice. They are also pretty generally agreed that in addition to the use of the radio telephone for the broadcasting of information and entertainment, it will become a valuable adjunct of the wire line for extending the wire service into locations where it is impracticable to operate wire lines and probably for emergency use during periods of interruption of wire service such as may be caused by sleet and other casualties.

The extent to which radio may be used to extend the range of telephone service will depend upon the possibility of developing dependable means for connecting the wire circuits to the radio circuits. The fullest development of this service will not come until it is possible to operate radio circuits under the same conditions and, as far as the telephone using public is concerned, by the same operating methods as are now used on long distance telephone lines. From the operating standpoint it would be desirable to have radio circuits terminate in the same way as long distance circuits and to have their operation identical with wire circuits as far as handling traffic over them is concerned. From the standpoint of the user they should provide two way conversation in the same way that the wire line does and the service should approach the wire service as closely as possible in quality and dependability.

The present stage of development is far from the ideal just described but great strides have been made in the last two or three years. The Los Angeles-Avalon circuit which includes a thirty mile radio link from the main land to Santa Catalina Island has been on successful operation and recently a number of demonstrations have been given of communication between the wire lines and the steamship America while the latter was several hundrd miles out of port on her transatlantic voyages. Not much has been presented in telephone journals and the present article is written to give briefly some of the lines of development that have been followed in achieving the results that have been attained.

Present Radio Equipment Has Limitations

Probably the most important requirement for point-to-point radio telephone communcation, whether direct or in connection with wire lines is that the circuit permit two-way conversation. The speaker at either end should be able to break-in or interrupt just as he is able to do in the present telephone circuit. Heretofore, radio telephone equipment has been developed largely on a one way traffic basis following the practice of the radio telegraph. Each station must take its turn in sending and receiving. It is true that a kind of duplex operation may be secured by use of a switch for changing the connections from sending to receiving and vice-versa, but the service obtained in this way falls much short of that obtained over the usual wire line. In principle the arrangement is shown in Fig. 1.

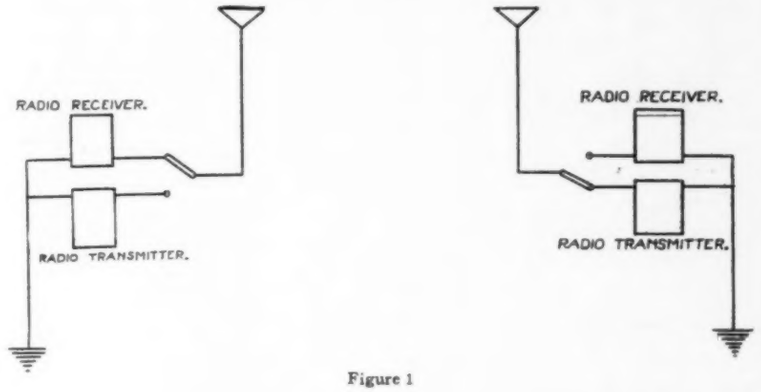


Figure 1

When the switch at station "A" is thrown to "send" the switch at station "B" is thrown to "receive". When "B" is talking the switches must be reversed at each station. Conversations between amateur radio telephone stations using this method of operation are frequently heard.

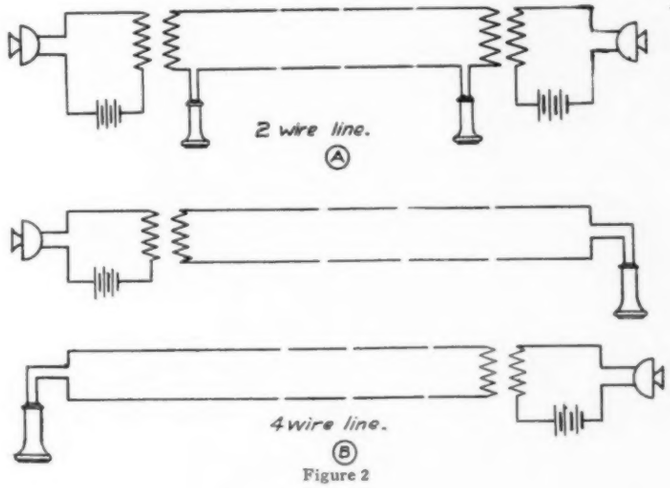


Figure 2

Development of Two-Way Circuit

The inadequacy of the switching method of duplex operation was early discovered in the telephone field. It must be remembered that the original telephone was essentially a one-way device. The same instrument, the predecessor of the present permanent magnet receiver, was used both for transmitting and receiving and it was necessary to switch the instrument back and forth between the lips and the ear while speaking and listening. It may be useful to refer to the methods which may be used for duplex wire telephony as a preliminary to considering the possibilities in radio telephony.

One system of duplex wire telephony may be obtained by the use of separate channels in each direction. This system may be called the four-wire system. A receiver and transmitter is provided at each terminal. The transmitter at the west terminal is connected to pair of wires to which is connected the receiver at the east terminal. The transmitter at the east terminal is in turn connected to a second pair of wires which lead to the receiver at the west terminal. Thus four wires are used, each pair carrying speech in one direction only. This arrangement is shown in Fig. 2A.

A more common and more simple arrangement is the ordinary two wire circuit in which the transmitter and receiver at each terminal are arranged to work into the same pair of wires. The arrangement for local battery transmission is shown in Fig. 2B. Although the speaker hears his own voice when using this type of circuit, this is not objectionable and the speaker at the distant end may interrupt and be heard as there are intervals at pauses when the receiver is at rest and between words.

On account of the simple and less expensive plant required when only a single channel is provided, the two wire system has been almost universally adopted but in recent years on circuits using telephone repeaters, it is common practice to convert two wire circuits to four wire circuits at repeater points and back again to two wire circuits as the line is extended. In some cases, particularly where

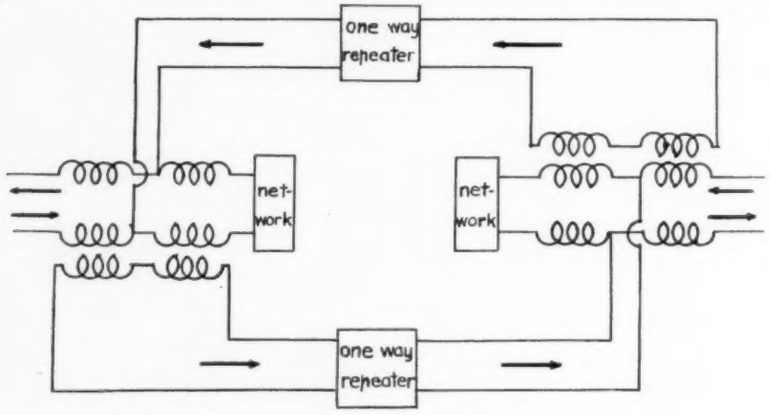


Figure 3

repeaters have been used in long cable circuits, four wire circuits have been used for considerable distances.

Circuits May Be Converted From Two-Wire to Four-Wire

In connection with the development of the telephone repeater means were developed to from single channel or two-wire circuits to double channel or four-wire circuits and from double to single channel circuits. Only a brief explanation of the method which is shown in Fig. 3 will be given here. (Note—For complete discussion see "Telephone Repeaters," by Gherardi and Jewett, Transactions of American Institute of Electrical Engineers, 1919, p. 1322, Reprinted in Telephone Engineer, Jan.-Apr., 1920.) The conversion is made by the use of a special form of transformer or repeating coil known as a "hybrid coil" and a network of resistance and capacity. The line west is connected through two windings of the coil to the network which is adjusted to have as nearly as possible the same electrical characteristics as the line with which it is associated. Incoming voice currents from the west pass through the two windings into the network and since they pass through the windings in the same direction, voltages are induced into the third winding which cause current to flow into the repeater. The amplified output current from the repeater flows to the mid-points of the windings of the hybrid coil associated with the line east where it divides, part flowing into the network and part into the line. As this current flows through the two halves of the windings in opposite directions no voltage is induced into the third winding of this coil as long as the system is perfectly balanced.

It is not necessary that the hybrid coils be located in the same office as the four wire line between the two coils may be extended from one office to the other. This arrangement may be compared with a single track railway having a double track section between two stations.

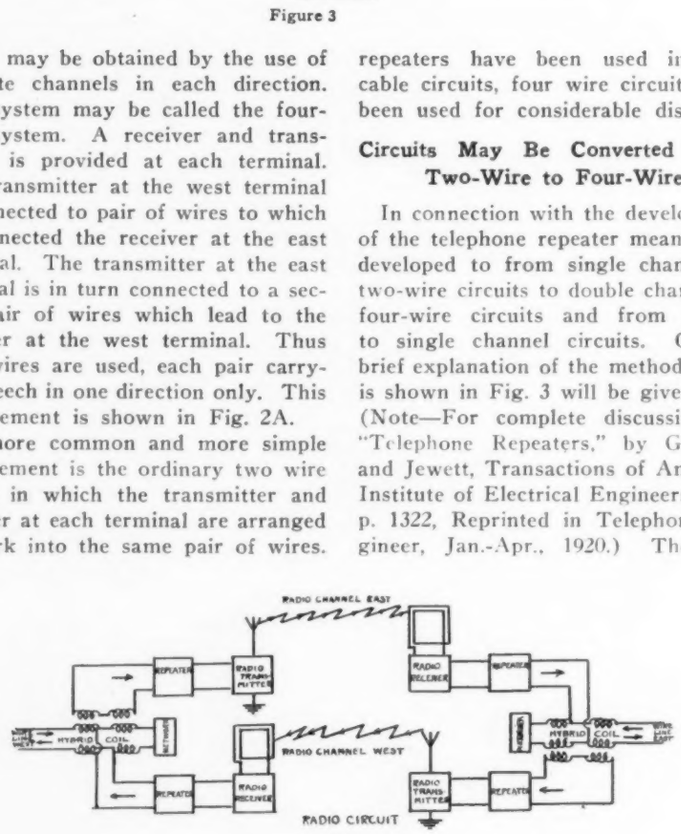


Figure 4

Methods of Duplexing Radio Telephone

Just as there are two possible ways of duplexing the wire telephone, so also two methods, a single channel and a double channel suggest themselves for duplexing the radio telephone. In this case, the "channel" is the wave length on which the set is operated. In the single channel method both stations might operate on the same wave length but a form of transmitter would be employed which radiated energy from the antenna only when the microphone was spoken into. In the ordinary radiophone energy is radiated continuously whether the microphone is excited or not. In this case the receiving set would receive the radiation from its own transmitter so strongly that the distant station would not be heard. The impossibility of reception from the distant station will be understood by anyone who has tried to listen to a distant radio broadcasting station while a strong local broadcasting station is operating. If the radiation from the antenna is suppressed except when the microphone is spoken into, the receiver will not be affected during the intervals between words and reception of the distant station would be possible. None of the radiophone

systems in use, as far as known employ this system but it may be possible to develop such a system. The use in carrier current wire telephony of a method for the suppression of the carrier wave might offer a hint to a possible solution.

Double Channel Circuit Is the Form Now In Use

The double channel method has been the one developed and used in the present systems of radio telephony. In this system the two stations transmit on different wave lengths and the receiving stations are separated by some distance or if this is impracticable as on shipboard, are arranged to be affected as little as possible and are provided with balancing arrangements to prevent interference. In the Los Angeles-Avalon circuit, the station on the main land transmits on 470 meters and the station on the Island on 400 meters. In some of the demonstrations between the America and the shore, the ship transmitter was adjusted to transmit on 420 meters and the shore station on 380 meters.

In the Los Angeles Avalon circuit the two wire long distance circuit is converted into a double channel circuit at the terminal and the outgoing channel is connected through a repeater to the radio transmitter. The incoming channel is connected from the radio receiving set to the hybrid coil. Fig. 4 is a schematic drawing reproduced from a paper by Clement, Ryan and Martin in the December, 1921, number of the Proceedings of the Institute of Radio Engineers describing the operation of this circuit.

Figure 5 is a more complete sketch of the arrangement of the Long Beach Station and is reproduced from the same article. Talking circuits are shown by heavy lines and the signalling circuits by lighter lines. The cordless switchboard is used for testing purposes and for monitoring the circuit. The signal units are arranged to work directly into the circuits without passing through the hybrid coil. The low pass filter serves to pass all frequencies necessary to voice transmission covering the range from 200 to 2200 cycles and chokes out all other frequencies. This tends to reduce interference and to make balancing of the circuit more easy. The signalling system is so arranged that the operator at either terminal may signal by inserting the plug into the jack associated with the circuit and ring in the ordinary way with her cord circuit ringing key. The drop at the distant end operates just as if the circuit were a wire circuit.

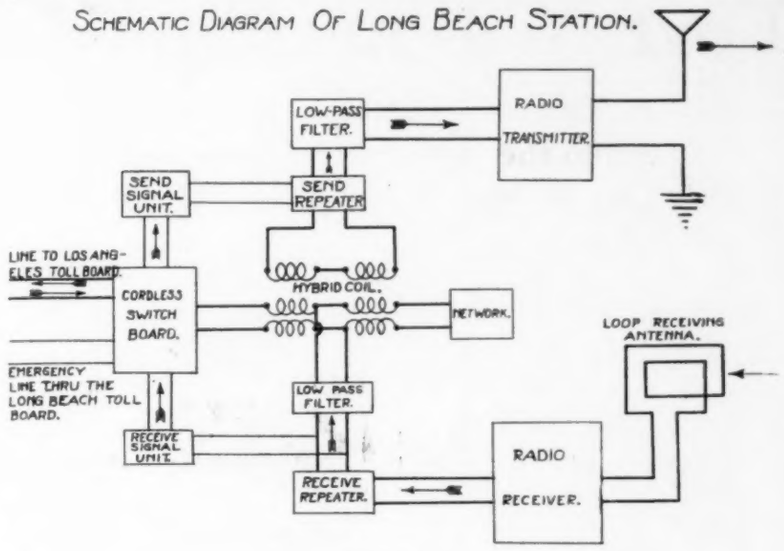


Figure 5

Receiving Station Uses Loop Antenna

It will be noted that Fig. 5 shows a loop antenna for receiving. This loop is about 6 feet square and has only four of five turns. On account of the directional characteristics of the loop, very little interference is experienced from other radio stations and from the radio transmitter of the local station. At the main land terminal at Long Beach, the loop is located in the central office building only a short distance from the transmitting antenna. At the terminal of the radio link on the Island, the transmitting equipment is located in a house directly under the antenna while the receiving equipment is located in another house one hundred feet away, placed so that the effect of the transmitting antenna on the receiving loop is a minimum.

The arrangement of stations used in transmission from shore to the S. S. America is shown in Fig. 6. In this case the transmitting station is located at Deal Beach, N. J., while the receiving station is located at Elberon a few miles distant. On shipboard the transmitting and receiving stations are necessarily located close together and this introduces some difficulties in the operation of high power transmitting sets that will make the development of non-interfering circuits of a high degree of selectivity, a matter of great importance.

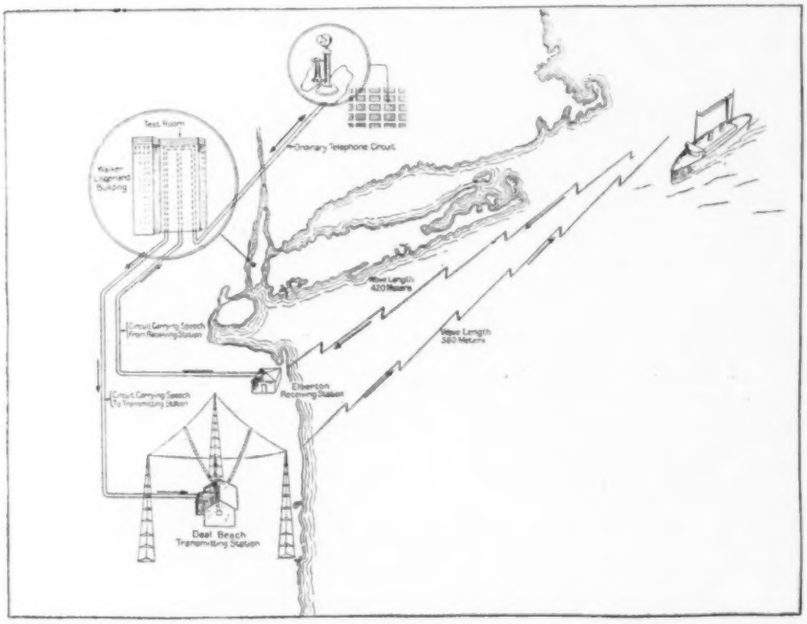


Figure 6

Fort Wayne Comes Back O. K.

A Tale of Snatching an Apparently Doomed Company From the Graveyard—How Bohn and His Bunch Worked Out of Misery—Building Team Spirit and a New Plant

By E. L. Gaines

Fort Wayne, Ind.—Away back in the beginning of telephony, Independently speaking, a group of business men in Fort Wayne decided their telephone rates were too high and the service too limited. The original Bell telephone patents had just expired and to follow the example of many other cities at that time and build a plant of their own seemed to be the logical way out of their difficulties. As every one knew, millions had been made in the telephone business and here was an opportunity not only to free the public from the "clutches of the octopus" but to reduce greatly their own rates; to share in a great civic enterprise; to obtain a large return on their investment, etc., etc. You know the story as well as any one else if you know what happened in your own home city in those days if you lived west of the New England States.

To make a long story short the year 1896 saw a new telephone plant in Ft. Wayne and The Home Telephone & Telegraph Co. had come into existence. One hundred of the leading business men of the city had subscribed for $100,000.00 worth of stock in the Company and thereby laid a foundation of customer ownership and its resultant good will that guaranteed the success of the undertaking. It may be pertinent to say right here that if today the majority of business leaders in all cities were customer owners of their public utilities' securities the problems of the utilities would be fewer and less difficult to solve.

First Officers Were Pioneer Independents

George W. Beers was the first President of the company and Theodore Thorward, Manager. At the time of its organization the Central Union Telephone Co. was operating some 550 telephones in the city. In two months' time the Home company had 800 telephones in operation and it was freely predicted that after a few years as many as a thousand might be connected to the system.

In 1898 Wm. L. Moellering was made Secretary and General Manager of the Company. Mr. Moellering's

FRANK E. BOHN
Secretary and General Manager, Fort Wayne Home Telephone & Telegraph Co.

work is too well known by telephone men to need much comment here. He took charge of the company in its infancy and through many years of the hardest kind of competition built it up to a large and successful concern operating over 15,000 subscribers' stations in the city of Fort Wayne and the surrounding rural districts and several hundred miles of toll lines in Indiana, Ohio and Michigan. One of the results of his management was the purchase in 1917 by The Home Telephone & Telegraph Co. of the local plant of the Bell company in Fort Wayne and the consolidation of the two systems into one. Competition in Fort Wayne was ended.

Federal Control the Beginning of Difficulties

Then the war came on with Federal control, and Postmaster General Burleson, who had his own ideas about the telephone business. Extensions and improvements could not be made. Maintenance was curtailed and deferred. The government needed the materials and the men. The entire plant, which keen competition had kept in a saturated condition, became super-saturated. All spare facilities were used. Every available cable pair was filled; all telephones were working; all switchboard space filled to capacity. Perhaps the fact that so much of the plant was working enabled the company to come through this trying period in good condition financially in spite of low rates.

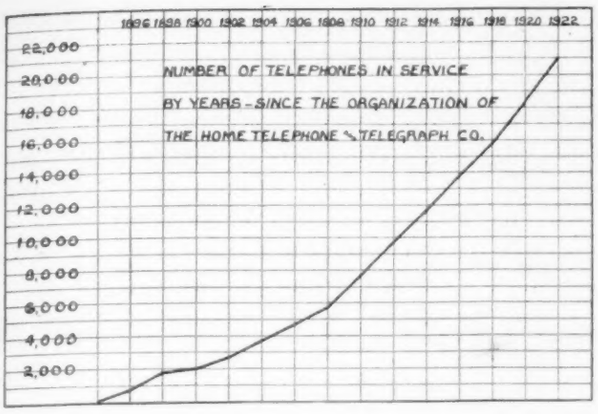
The end of the war found the company entering a new period of its existence. Those who are familiar with the telephone business are also familiar with the problems the after-war period brought to the public utilities of the country. Practically all of the difficulties confronting all other telephone companies had to be contended with in Fort Wayne. Most of these were augmented by the long period of intensive competition the company had gone through and the policy of strict economy in the building and operation of the plant made necessary by that competition.

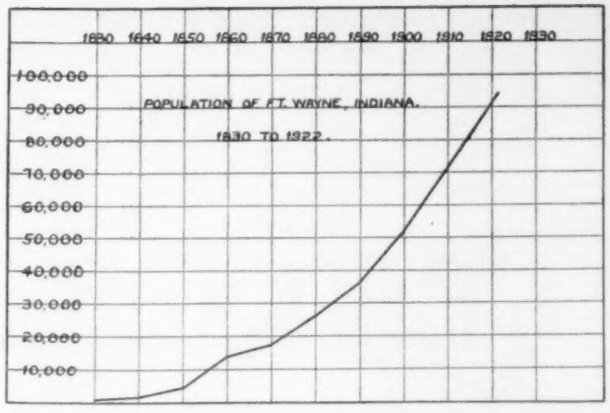
Many prospective subscribers were clamoring incessantly for telephones and could not be cared for on account of the saturated condition of the plant. The entire plant, like the majority of Independent plants, had been built piecemeal, without any idea of what the ultimate plant might be and consequently with no extensive engineering plans for future growth. The earliest predictions of the optimistic stockholder that the property might eventually serve the stupendous number of 1,000 subscribers was not easily forgotten, and as this figure was doubled and doubled again and yet again, even in face of strong competition, those responsible for the management of the property could do little more than care for present needs. The problems of the present had always been so urgent that the future was of necessity left to be met when the time came.

The Company "In Bad"

Due to these facts and conditions, the plight of the company after the war might be summed up briefly as follows:

1. The service had depreciated to a





point where the subscribers were not only greatly dissatisfied but were "up in arms" about it and many applications for service all over the city could not be cared for.

2. The company's employes were dissatisfied with wages and working conditions and had become strongly unionized. Even the operators had presented an ultimatum to the management and were threatening to strike.

3. Not only was the plant overcrowded but was fast becoming obsolete and was in a general run down condition. In fact what we usually term the rebuilding period, had arrived. Practically the entire plant needed rebuilding along definite lines which would provide adequately for future growth.

4. The confidence and good will of the public was lost and had to be won back through advertising and various other means of publicity.

5. The rates established by Postmaster General Burleson, low as they were, were in danger of being placed at a still lower level as State Commission control approached. Rates had to be raised high enough to pay operating expenses and fixed charges and attract capital for extensions.

Bohn as "Pinch-Hitter"

In 1919 when Frank E. Bohn assumed the duties of General Manager of the company the foregoing conditions did not lend a very bright outlook for the future. Mr. Bohn had been with the company since 1907 and had been Secretary and Assistant General Manager since 1910, and was thus thoroughly familiar with the situation when he assumed the full responsibilities of management. This article is not intended to be an eulogy of Mr. Bohn's management of the company, but a description of the problems which have been solved since 1919 and the problems that are being solved today. These are problems which confront a large number of telephone operating men and we shall therefore, dwell largely upon the means used by the present management in solving these present day problems in which we are all interested.

Morale of the Employes Improved.

One of the most vital needs of the company at the close of the war and one of the things most necessary to carry out the policies of the management was an organization with a personnel capable of handling the work. Heretofore the company had been of necessity largely a one man concern, so far as management was concerned. The critical point in the size of the property had now been reached where it was necessary to establish separate departments for carrying on the increasingly large volume of business to be handled. Accordingly department heads were placed in charge of plant, accounting and traffic, and various sub-heads as needed were placed in each department and a functional organization established. Regular weekly meetings of department heads were inaugurated in which the policies of the management were outlined and matters pertaining to the business and methods of procedure and operation were discussed.

Wages were increased to conform with increased living costs and working conditions of employes were improved. Departmental meetings of employes in the various departments were held by department heads to inform all employes of changes in methods of operation or standards of construction and to instill in their minds a spirit of loyalty and service. These meetings were largely held on the company's time and were productive of splendid results.

Employes were told of the company's problems and the efforts being made to solve them and were appealed to, to do their utmost to help in every possible way in the big task ahead. The employes were convinced the company was treating them fairly and would continue to do so in the future. They responded by taking up the work with a will, and progress was made from that time on.

The winning of the good will of the employes was the first big step towards victory in the battle of rehabilitation. The poorest advertisement that any company can have is a dissatisfied employe who takes advantage of every opportunity to tell of his dissatisfaction to others, most of whom may be subscribers.

Inversely the proposition also holds true, for one of the best ads any company can have is an employe who is continually boosting for his company. It must be remembered that an employe's family is usually convinced that the employe is right and as he talks so will they talk. Nor does it stop at the family; there are usually a large number of relatives and friends who are soon informed of conditions, whether right or wrong, and almost over night an entire city may be reached through employe advertising. Too great emphasis cannot be laid upon the importance of keeping employes on the company's side and this can only be done by giving them a square deal and also by giving the information they need to enable them to understand and explain to others the answers to the many questions arising daily in the minds of the public regarding the public utility.

With the good will of the employes once obtained it was a comparatively easy matter to retain it. In order to obtain the right spirit of fellowship between employes themselves, baseball and bowling teams were organized among the men and basket ball and a Y. W. C. A. organization among the girls. Definite plans for an employes' association of all Company employes are now under way which will not only continue the work along social and athletic lines but will deal directly with wage problems and working conditions and all policies regarding va-

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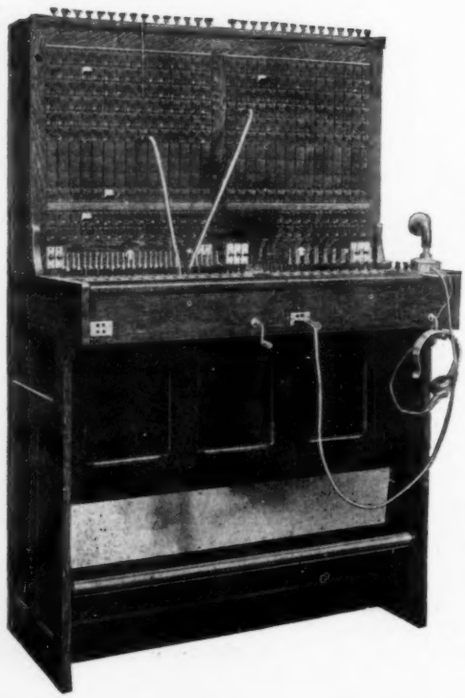
For Maximum Service Lin

Desk Set No. 43 is distinguished by its simplicity of mechanism. Telephone engineers regard this as a noteworthy achievement in design, and the test of years of service has proven its merits.

An off-center stand of exceptionally pleasing design is a feature of the American No. 114 Automatic Desk Telephone. Superb mechanical construction make this instrument deserving of the careful investigation of every Automatic Exchange Manager.



Burns Express Switchboards are the results of years of experience in the manufacture and designing of switching apparatus. Many features of advantage are used exclusively in these switchboards, assuring the highest quality of service and durability. Floor type cabinets can be supplied with any number of operators' positions. In the smaller capacities the popular low key shelf is furnished when desired.

Desk Style Cabinets, and Sanitary Tables or Desks make popular switchboards for small or private exchanges. Wall type switchboards are of the ringer and drop type, and designed to give best service in the small exchange.

A stock of standard equipment is carried by a distributor in your territory.

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ANSWITCHBOARDS

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The X69 Magneto Wall Telephone is made with enclosed gongs, a neat and compact cabinet, and a new and logical arrangement of standard parts. The ringer, with 3 inch gongs is mounted inside the cabinet. Slotted plates on each side of the cabinet permit ringing being distinctly heard.

All parts of this telephone are of the standard designs which have proven their superiority through years of use. Full length adjustable transmitter arm, lightning arrester of air gap type, eliminating carbon dust.

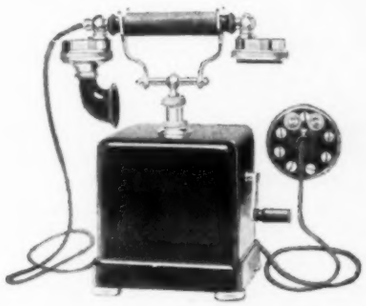
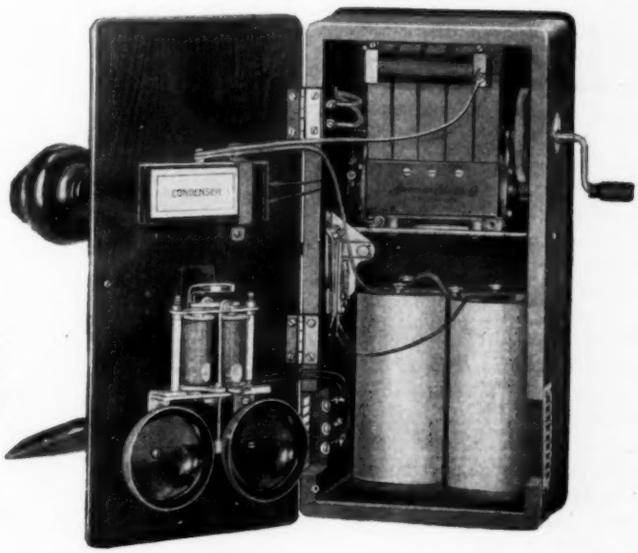


Table Sets using the popular hand microne now are furnished by us for both mmon battery and magneto use. This e of equipment is growing greatly in ularity. You can make a big hit with l "captains of industry" by installing se sets in their offices.

RADIO EQUIPMENT

Amateurs will have confidence in the chase of Radio equipment from the phone company that is fully justified en you supply them with American Elec- Head Receivers, Microphones, Keys, ks, Plugs, etc. There is a good profit in for you.



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cations, sick and accident benefits, pensions, etc.

Educational Advertising Brought Public Confidence

With the employe dissatisfaction relieved it was next necessary to devote a great deal of attention to the attitude of the subscribers and the general public toward the company. A long program of educational advertising and publicity, backed by actual performance in delivering the goods, was necessary to convince them of the honest efforts of the company to give them full value for their money in service performed. The employes themselves were perhaps the biggest factor in bringing about the desired change in the attitude of the public toward the company. But the employes could not do it all. A newspaper advertising campaign was started which not only explained the local problems of the company but also covered a long series of educational topics on the how and why of the use of the telephone. The management periodically gave out interviews to the newspapers telling of the plans of the company for extensions and improvements of the service. Talks were made before all of the leading clubs of the city by various officials of the company and several leading clubs were entertained by the telephone operators at luncheon meetings in the company's offices and conducted on personal tours of inspection of the operating rooms.

Every available story having any real news value was given the newspapers which were always glad to publish them. In short, the policy of the management was to tell the public and to tell it first; that is, not to wait until a thing was done but to tell it before it was done, when it was being done, and also when it was finished.

Of course this advertising and publicity had to be backed up by actual results. The service had to be improved and placed on an efficient basis as rapidly as possible. Extensions to the plant had to be made and telephones installed to take care of those who were demanding telephone service. Repairs, extensions and improvements to the plant had to be made to make possible the improvements and extensions in service and when any of this work was planned or when any of it was actually started or when it was completed, the public was fully informed through the columns of the local newspapers as to just what was being done and why, and the difficulties encountered in the work.

It may be stated as a fact that if the public is convinced that a telephone company is doing everything in its power to give good service and improve existing poor service conditions it is ready and willing to overlook many minor and even some major service defects. If, however, the public thinks the telephone company does not care whether it gets good service or not and is not honestly endeavoring to serve it, it will loudly complain of the service even though that service be the best.

A Program of Rebuilding and Extension

As mentioned before, the condition of the Fort Wayne plant at the close of the war was such that a comprehensive program of rebuilding and extension was necessary. This had to be carried on along two separate and distinct lines. In the first place immediate relief for the overcrowded condition of the plant had to be given in order to care for the many waiting applications for service. It was also necessary to make very extensive repairs and replacements to the existing plant to permit the continuance of service to existing subscribers. This work was of necessity expensive because it could not be made to conform with any comprehensive set of plans for the ultimate plant of the future and therefore was not of a permanent nature.

Besides this work demanding immediate attention, the time had arrived when fundamental plans had to be made for rehabilitating the plant and this necessitated a complete engineering survey of the city, keeping in mind both the past known growth as well as the anticipated growth of the future. Every one familiar with the local history of Fort Wayne believed it was approaching a period of prosperity and rapid growth greater than anything it had ever known before.

Fort Wayne a Growing Manufacturing City

Fort Wayne is situated almost exactly at the center of population of the United States as shown by the 1920 federal census. It has excellent railway facilities, being served by a number of the largest trunk line railways in the United States, which radiates in all directions from the city. Although it is essentially a manufacturing city it is fortunate in having diversified manufacturing interests which are not greatly affected by hard times or market fluctuations. In more than two centuries of its existence, Fort Wayne has never had a bank failure.

Among its factories it boasts of the largest hosiery knitting mills in the world; one of the largest electrical manufacturing plants in the world; the largest manufacturer of gasoline filling stations in the world. Two thirds of all gasoline filling stations manufactured are made in Fort Wayne. Besides having one of the largest plants of the General Electric Co. with several thousand employes it also has one of the largest plants of the Edison Lamp Works and a second plant just completed. The second largest car wheel manufacturing plant in the world is located in Fort Wayne and an usually large number of smaller manufacturing plants of electrical devices. In fact almost everything from hoe handles to city gas

Fort Wayne's Main Office Switchboard Handles Heavy Traffic

plants is listed among the city's manufactured products.

Fort Wayne is essentially a city of homes. It has the second highest percentage of home owners of any city in the United States of its size or larger. The natural result of this condition is satisfied workers, and although Fort Wayne has had labor disturbances it has probably had less labor trouble than any manufacturing city of its size in the country.

In 1920 the International Harvester Co. announced its plans for building its largest motor truck plant in Fort Wayne which when completed would be the largest motor truck plant in the world and employ 8,000 men. Construction of the plant was started in August, 1920 and is now so far under way that actual production will begin within a few months. A conservative estimate gives Fort Wayne an added population in the next three years of 35,000 people as a result of the activities of the International Harvester Co. alone.

A belt line railway completely encircling Fort Wayne will connect with all trunk line railway systems entering the city and gives splendid trackage and shipping facilities to the entire city. Several large housing corporations and development companies have been organized during the last two years and adequately financed to prepare for housing the increase in population. Almost every large manufacturing concern in the city has a definite program outlined for making large extensions in the immediate or near future.

Engineers Were Employed to Make Development Study

Even a brief survey of conditions in Fort Wayne will convince one of the necessity for immediate action on the part of its public utilities and especially of the telephone company to take care of the growth of the city during the next few years. Realizing that the time had come when definite steps should be taken to meet the demands of the future the company employed a firm of competent consulting telephone engineers to make a development study of the city and a fundamental plan for the ultimate plant as of some future period, say, twenty years ahead. This survey, begun in September, 1920, was as comprehensive in extent as anything of the kind could be. Every possible factor of past or present which might in any way affect the growth of the city was taken into consideration in making up the detailed fundamental plan for the ultimate plant. With these plans completed it is possible to build any separate unit or part as needed and have each part fit in as a unit of the ultimate whole. Definite standards of equipment, construction and maintenance and operating methods have been adopted conforming to the latest and best engineering practices.

While this work has been under way it has been necessary to do a large amount of extension work of a more or less temporary nature to take care of present demands for service. Old, dilapidated, heavy leads of aerial wire had to be replaced with aerial cable on existing pole lines. Much of this new work as well as many extensions to the existing aerial and underground cable plant could not be made to conform to plans for the future plant and must of necessity be taken down when construction on the ultimate plant has progressed to a point that will permit its removal. In every possible case the new plans make use of the existing plant.

In both offices of the company, switchboard facilities were entirely consumed and expensive temporary extensions to the switchboard were made necessary to take care of present needs. Additional service features were added to the switchboards relieving the operators of certain parts of the work permitting a heavier operator loading and consequently a larger total switchboard capacity. To illustrate the crowded conditions that had to be contended with, it was necessary to obtain permission from the city to build an extension to the terminal room on the third floor of the Main office building extending out over an alley to make room for terminal facilities sufficient to care for two or three more years' growth.

The building program for the immediate future calls for two new central office buildings located in the telephone centers of their respective districts together with about thirty-five miles of additional underground trench in the outside plant. All main leads in the city will be placed underground and all lines in the city in aerial or underground cable. New central office equipment will be provided in both new offices.

Adequate Rates Necessary

The foregoing brief history and recital of conditions cannot but bring forcibly to mind the fact that the one thing most necessary to success in carrying out the plans as outlined was adequate rates. But little could be done without money. Rates which would provide an income sufficiently large to operate and maintain the plant and give service of a higher standard than had been given in the past and at the same time pay a fair return on the money invested in the property were the only hopes of attracting sufficient new capital to take care of extensions.

The following rates had been established by Postmaster General Burleson during the period of federal control:

	Per month
Individual business	$4.00
Two-party business	3.00
Four-party business	2.50
Individual residence	2.50
Two-party residence	2.00
Four-party residence	1.50
Farm line telephones	1.50

These rates were a little higher than the rates charged before the war but were not sufficiently high to take care of enormously increased after-war costs and before the period of Federal control was terminated the management foresaw the necessity of securing higher rates.

Prior to June 27th, 1917, the company had been operating its Fort Wayne property under a franchise granted by the city. On this date it surrendered its franchise and elected to operate under the control of the Public Utilities Commission of Indiana. The period of Federal control had temporarily released the Company from state control. The act of Congress terminating Federal control also made Federal rates effective until December 1st, 1919. Shortly after the announcement of the release of telephone properties from Federal control the Public Utilities Commission announced its intention of investigating all rates established by Postmaster General Burleson within the State of Indiana and making such adjustments as it found necessary. On November 28th, 1919 the Commission issued an interlocutory order continuing the Federal rates until it had time to hear the various cases of the companies affected.

The City of Fort Wayne had already petitioned the State Commission to have the rates in Fort Wayne reduced, claiming the company was making too much money and the service was poor. The company in return petitioned for an increase in rates above the Burleson rates as follows:

	Per month
Individual business	$5.00
Two-party business	3.50
Four-party business	3.00
Individual residence	3.00
Two-party residence	2.25
Four-party residence	1.75
Farm line telephones	1.75

A hearing of the two cases was held in October, 1919, in Fort Wayne and

on March, 1920, the Commission issued an order reducing the rates and placing in effect the following schedule:

	Per month
Individual business	$3.50
Two-party business	2.50
Four-party business	2.00
Two-party residence	1.75
Four-party residence	1.50
Farm line telephones	1.50

Recommendations by the Commission's engineers called for numerous improvements in facilities for handling the service as well as sufficient extensions to the plant to take care of waiting applications for service.

The company operated under these rates for almost a year before a second petition for higher rates was filed before the State Commission. The rates asked for at this time were higher than any asked for before and were expected to yield a return of seven per cent on the investment after allowing for operation, maintenance and depreciation. The following rates were asked for:

	Per month
Individual business	$6.00
Two-party business	5.00
Four-party business	4.00
Individual residence	2.75
Two-party residence	2.25
Four-party residence	1.75
Farm line business	2.50
Farm line residence	1.75

The company also petitioned for authority to sell $500,000.00 in three-year seven per cent notes to finance improvements and extensions, some of which had already been made. A hearing in the case was held May 23, 1921, at Fort Wayne. The City of Fort Wayne again opposed the company, claiming it was already making a fair return on its investment. The city admitted at this hearing, however, that the service had been improved to the point where no grounds existed for complaint by subscribers.

On June 29, 1921, the Commission issued an order denying the company's petition insofar as rates were concerned, but granted permission to sell one-half million dollars' worth of three-year seven per cent notes. The company was thus left in no better condition than before the hearing was held for it was impossible to sell the notes without being able to show an earning that would pay a fair return on the investment. The company, therefore, immediately petitioned for a rehearing of the case, claiming a number of errors in the findings of the Commission. On August 17, 1921, the rehearing was denied.

The company had now reached what was probably the most critical point of its existence. Higher rates had to be obtained or the company would be forced into the hands of a receiver. The company had intimated that if its petition in this case were denied it would be compelled to take recourse to the courts. Accordingly on August 26, 1921, the company entered complaint in the United States District Court at Indianapolis, claiming its property was being confiscated and asking for an injunction against the Public Utilities Commission of Indiana to prevent it from interfering with the company's charging rates that would bring a fair return on the investment. The Commission in return moved to dismiss the case for want of jurisdiction. A hearing was immediately granted by Judge Albert B. Anderson, who overruled the Commission's motion and called the case to trial December 5, 1921. The case was heard by Charles Martindale, Master in Chancery, an entire week being consumed in taking testimony. This case was one of the first of the kind ever taken to Federal Court and attracted a great deal of attention among public utility operators. After over a month of deliberation the court issued a decree granting the injunction prayed for in the complaint and permitting the telephone company to establish the rates asked for in its former petition to the State Commission. It also restrained the commission from interfering with the company's charging such rates until such time as just and reasonable rates were fixed by the commission. The decree became effective February 10, 1922, upon the filing in Federal Court by the company of a bond for $150,000.00 protecting the subscribers against overcharge and guaranteeing a refund to them of any such overcharge for services that might be made under this order. Accordingly on February 10, 1922, the company placed in effect the schedule of rates last petitioned for before the commission and these rates are in effect at the present time. Following the action of the court it was an easy matter to arrange with Fort Wayne bankers for the sale of the $500,000.00 note issue authorized by the State Commission.

New Rates Remove Last Obstacle

Under the new rates the company has been able to operate its property in such a manner that service complaints have become less and less frequent and extensions to the plant are being rapidly made and have been completed to such an extent that only a comparatively small subscribers' waiting list now exists. Most of the new work now being done conforms to the fundamental plant for Fort Wayne and is, therefore, in the nature of a permanent investment. A large amount of publicity has been given the company's activities during the past few years and especially its construction activities of recent months and it can be truthfully said that the company is no longer "in bad" with its subscribers. This change of heart on the part of the public is due partly to the policy of the management of letting the public know what it was doing at all times, partly to the changed attitude on the part of the employes toward the company itself and very largely to the fact that the company is actually delivering the goods in furnishing good service at a reasonable rate to all who want it.

The future will have its problems, but no doubt the same policies which have successfully solved the problems of the past months will work equally well in helping to solve those of the future.

Sweden Has First Phone Strike in Twenty-Five Years

Stockholm, Sweden.—The Telegraph and Telephone Operators' Union, with a membership of about 500, went on strike some time ago, and made great efforts to induce the telephone girls to join it. Contrary to what had been expected, it succeeded, and the strike in Stockholm, as well as in Gothenburg, has been of several weeks' duration. The telephone girls wanted collective agreement instead of the personal agreements now in force. The Board of Telegraphs did not agree, especially as there would be an increased cost in connection with it, which would fall upon the subscribers. Besides, wages now paid to the telephone girls are in 1917 37-92 per cent higher than they were when the increased cost of living has been considered. The Telegraph Administration, therefore, declared that those who wanted to resume work had to appear before a certain time, but the Government said that there would be no objection to a collective agreement, and thus the settlement of the strike was postponed. The Telegraph Workers' Union insists that all the telephone girls shall be taken back to work immediately and no difficulties whatever, be made on account of their having taken part in the strike. This the Board cannot promise, as it will have to give work to those who have helped over the strike. It is 25 years since the last and only previous telephone strike took place, and nothing was gained by it, says a foreign correspondent.

Practical Plant Problems

Chapter VII—The Fundamental Plan—Continued

By Charles W. McKay, Associate Editor

In the September installment—in connection with Fig. 6—a typical fundamental plan section-map was considered. It is suggested that the reader review this figure briefly—although it will not be necessary to reproduce it in the present installment.

Our final analysis of the problem, as represented by the illustration in Fig. 6, involved the installation of a 200 pair aerial feeder cable on Avenue A—the first relief cable being installed on Avenue E and the second relief cable on Avenue C. It will also be remembered that the following factors were considered—in determining whether the initial feeder cable should be placed aerially or in an underground conduit system:

1. The number of pairs required for feeder facilities at the time of the initial installation.

2. The subscribers' requirements—in terms of lines, or pairs—at the end of the five year period and also the rate at which the expected growth increase will take place.

3. The number of lines that will be required to provide service for the ultimate period.

4. The size of cable which may be carried safely on a pole line of average size and strength. In connection with this factor, it may be said that a 400 pair cable is about the limit as to size—for aerial feeder use. From the standpoint of mechanical strength, it is perfectly possible to so design a pole line as to facilitate the use of a 600 pair cable. 600 pair cables, however, are unsightly—and except in unusual cases they should not be used for aerial feeder purposes.

In the September installment it was also suggested that section maps—similar to the one presented in Fig. 6—should be prepared for the entire territory under analysis. After all of these sectional fundamental plans have been prepared the line requirements should be traced toward the central office—with a view to determining the underground conduit and cable requirements. These requirements should, of course, be determined for the initial, five-year and for the ultimate periods.

In a previous installment the method of locating the central office site; the main feeder artery and the branch feeder routes, was discussed in some detail.

We will first consider the engineering features involved in the planning of the underground conduit system. The guiding factor in determining the number of conduits, required, will be the ultimate line requirements.

At this juncture it may be well to add a word of caution as to progressing too far with the detail involved in preparing individual fundamental plan section maps (as illustrated in Figure 6 of the September issue), until the exact location of the feeder routes has been determined. After ascertaining the tentative location of the feeder routes—from a theoretical standpoint—a careful investigation should be made as to each of these routes, with a view to determining the practical features involved. It is frequently necessary to modify the development study, and the fundamental plan, due to the fact that sub-surface conditions—along certain of the proposed routes—render the installation of a conduit system inadvisable from a practical standpoint.

Each proposed conduit route should be carefully investigated—through the medium of all available records in the City Engineer's office—as to existing sub-surface conditions. In most cities it will be found that city records are available showing at least the approximate locations—and the sizes—of electric light conduit systems, gas, sewer and water mains, etc. It is frequently advisable to supplement the information—as obtained from the City Engineer's office,—by digging "test-holes" along the proposed subway route. These holes may be located at proposed manhole sites—thus minimizing the cost of the work. The data resultant from the "test-hole" investigation will not only serve to verify the accuracy of the city records—as to existing sub-surface structures—but it will also afford valuable information as to soil conditions.

If it should develop—from the "test-hole" investigation and the search of the city records—that a certain proposed subway route is already unduly congested (through the prior installation of electric light subways, gas, sewer and water mains) or that the trenching conditions are unduly difficult (due to the existence of rock or quicksand) the route in question should be abandoned and the fundamental plan changed accordingly. It is usually possible to make slight alterations in the preliminary fundamental plan (as resultant from the theoretical development study) without "unbalancing" the whole scheme as involved throughout the development study. Such minor changes—such as the shifting of a proposed subway route from one street to an adjoining parallel street—where undesirable subsurface conditions are involved, frequently results in a material monetary saving (from the construction standpoint) without seriously affecting the fundamental plan.

If the problem proves to be one involving the consideration of several alternate plans,—the various plans should be considered from the standpoint of both first costs and annual charges,—before the final solution is determined upon. The annual charges, it will be remembered, include the following:

1. Interest on investment.

2. Depreciation and maintenance allowances.

3. Taxes and insurance (where the type of plant involved necessitates a consideration of these latter items—of course there are no insurance charges on underground plant).

From a detailed consideration of the first costs and annual charges involved in each of the alternate plans it will be possible to arrive at a satisfactory solution of the problem.

In planning the underground conduit system, one factor should be clearly borne in mind. Underground cables can never be utilized to their full capacity. An allowance must be made for space facilities and for the failure of cable pairs. Hence we must provide a safety factor—in other words, we must provide cable facilities in excess of the ultimate line requirements.

To illustrate—assume that having traced the data resultant from the de-

velopment study back toward the central office, we find that the ultimate requirements, for a certain area, are 1200 pairs. If we further assume that the 600 pair cable is to be used as the unit of underground feeder distribution—it may seem to the reader, at first glance, that only two ducts will be required, one for each 600 pair cable.

However, to allow for the safety factor, we must provide underground cable facilities in excess of 1200 pairs, —and hence, if we use the 600 pair cable as a unit, three ducts will be required.

The problem of determining the number of ducts for a given feeder route, therefore, resolves itself into one of determining the ultimate number of subscribers' lines which the subway in question will have to serve—and of subsequently determining the sizes of feeder cables, making due allowance for the "safety factor."

In a previous installment, the use of the 1200 pair feeder unit was referred to. While it is true that this unit is used in the larger cities—we have confined our present discussion to the consideration of 600 pair, and smaller, feeder cable units.

In Figs. 8 to 13, inclusive, the duct requirements—necessary to meet the subscribers' line requirements — for various sizes and gauges of cables are presented. These tables represent the result of an engineering study of one of the larger telephone companies—and are reproduced through the courtesy of this company. In considering the tables the reader should remember, however, that no hard and fast rule may be laid down—and that the safety factor (or "constant efficiency," as it is referred to in some of the tables) may vary according to the peculiar conditions existent in individual cases. In many instances the safety factors may be higher than those presented in the tables—in other cases they may be lower.

In the November installment the problem of determining manhole sizes will be discussed. This will complete the underground conduit phase of our study and we can then proceed to a discussion of the subject of the splicing problems involved in the installation of underground feeder cables.

Ducts.	Working Pairs.	Safety Factor or Net Efficiency
4	1,858	77.4%
5	2,430	81.0
6	2,970	82.5
7	3,515	83.7
8	4,056	84.5
9	4,590	85.0
10	5,130	85.5
11	5,669	85.9
12	6,192	86.0
14	7,241	86.2
16	8,304	86.5
18	9,674	86.8
20	10,440	87.0
22	11,484	87.0
24	12,542	87.1

Fig. 8.—Duct Requirements for Subscribers' Lines in 600-Pair, No. 22 Gauge Cables.

Ducts.	Working Pairs.	At Net Efficiency of
1	200	50.0%
2	504	63.0
3	864	72.0
4	1,238	77.4
5	1,620	81.0
6	1,980	82.5
7	2,344	83.7
8	2,704	84.5
9	3,060	85.0
10	3,420	85.5
11	3,780	85.9
12	4,128	86.0
13	4,477	86.1
14	4,827	86.2
15	5,184	86.4
16	5,536	86.5
17	5,896	86.7
18	6,250	86.8
19	6,604	86.9
20	6,960	87.0
21	7,308	87.0
22	7,656	87.0
23	8,004	87.0
24	8,362	87.1
25	8,710	87.1

Fig. 9.—Duct Requirements for Subscribers' Lines in 400-Pair, No. 22 Gauge Cables.

Ducts.	Working Pairs.	At Net Efficiency of
1	150	50.0%
2	378	63.0
3	648	72.0
4	929	77.4
5	1,215	81.0
6	1,485	82.5
7	1,758	83.7
8	2,028	84.5
9	2,295	85.0
10	2,565	85.5
11	2,835	85.9
12	3,096	86.0
13	3,358	86.1
14	3,620	86.2
15	3,888	86.4
16	4,152	86.5
17	4,422	86.7
18	4,687	86.8
19	4,953	86.9
20	5,220	87.0
21	5,481	87.0
22	5,472	87.0
23	6,003	87.0
24	6,271	87.1
25	6,533	87.1

Fig. 10.—Duct Requirements for Subscribers' Lines in 300-Pair, No. 19 Gauge Cables.

Ducts.	Working Pairs.
1	320
2	640
3	960
4	1,280
5	1,600
6	1,920
7	2,240
8	2,560
9	2,880
10	3,200
11	3,520
12	3,840
13	4,160
14	4,480
15	4,800

Fig. 11.—Duct Requirements for Local Trunk Circuits in 400-Pair, 22 Gauge Cables. At 80 Per Cent Constant Efficiency.

Ducts.	Working Pairs.
1	240
2	480
3	720
4	960
5	1,200
6	1,440
7	1,680
8	1,920
9	2,160
10	2,400
11	2,640
12	2,880
13	3,120
14	3,360
15	3,600

Fig. 12—Duct Requirements for Local Trunk Circuits in 300-Pair, No. 19 Gauge Cables. At 80 Per Cent Constant Efficiency.

Ducts.	Working Pairs.
1	64
2	128
3	192
4	256
5	320
6	384
7	448
8	512
9	576
10	640
11	704
12	768

Fig. 13—Duct Requirements for Toll Lines and Toll Switching Trunks in 80-Pair, No. 13 Gauge Cables. At 80 Per Cent Constant Efficiency.

Shanghai Begins Installation of Automatic Telephones

Shanghai, China — The Shanghai Mutual Telephone Co. has recently ordered 500 automatics be installed in its East Station, the smallest of the company's plant, as an experiment, but if the project meets with success it is likely that the system will be adopted throughout the city, says Eastern Engineering.

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Western Electric Celebrates Its Fortieth Birthday in Belgium

Antwerp, Belgium.—The International Western Electric Co. is just celebrating the fortieth birthday of its Belgium protege, the Bell Telephone Mfg. Co. of Antwerp, one of the most flourishing manufacturing concerns on the other side of the Atlantic. This organization dates back to 1882, when a Western Electric man went over to Europe and gathered together a modest shop force of seven untrained native workmen, which was the nucleus of a factory that has expanded until today it employs 3,000 skilled operatives and ranks as Belgium's fifth largest exporting industry.

Valuation in Rate Making

Chapter VIII—The Theory of Depreciation

By Charles W. McKay, Associate Editor

In the September installment we completed our consideration of inventory problems. Before taking up the subject of unit cost derivation it is deemed advisable to consider the subject of depreciation—both with respect to its relation to the present values of telephone properties and respect to the accumulation of annual reserves for depreciation. Depreciation reserve funds, it will be remembered, are accumulated for the specific purpose of providing the necessary moneys for replacing wornout, inadequate and obsolete telephone property.

It is impossible to exaggerate the importance of the subject of depreciation — and, quite naturally, we must thoroughly understand the theory of depreciation before we can take up a consideration of the practical application of depreciation to valuation problems and to the problems involved in building up reserve funds.

As a preface to this chapter it may be well to review the definition of depreciation. The Standard Dictionary defines depreciation as "a lowering in worth." Another excellent definition of depreciation — especially from the standpoint of telephone problems—is the one advanced by Dr. R. H. Whitten. Dr. Whitten says, "Depreciation may be defined as the **lessened utility value** caused by physical deterioriation or lack of adaption to function." In this definition, it will be noted, that Dr. Whitten makes a distinction between "physical deterioriation" and "lack of adaption to function." Most authorities on depreciation make this distinction and refer to depreciation due to physical causes as "physical depreciation." Depreciation due to non-physical causes — such as inadequacy and obsolescence is usually termed "functional depreciation."

Physical depreciation, in turn, is usually subdivided into two classifications — in public utility valuation work. These classifications are:

(a) Depreciation due to wear and tear.

(b) Depreciation resultant from age and physical decay.

Referring again to Dr. Whitten's definition — by far the most usual cause of "lessened utility value" is the depreciation resultant from physical causes. In the case of industrial properties the depreciation resultant from wear and tear (or use) is far more important than the depreciation resulting from age or physical decay. Industrial machinery is in constant use and—entirely aside from the replacable parts—it depreciates rapidly as a direct result of actual use.

In the case of telephone properties, however, this is not true. Poles, wire, cross-arms, cable and conduit are subjected to very little **mechanical** usage. Even in the case of the central office equipment the wear and tear depreciation factor is not as important as it may seem to the casual observer. Most of the parts of the modern telephone switchboard (which are actually submitted to mechanical handling) are of an easily replacable nature. Among these parts may be included switchboard cords, plugs, keys and answering jacks. The wear and tear on such parts is not provided for through depreciation reserve funds—but rather through maintenance charges.

Nevertheless, it is a fact that telephone property does depreciate—to a minor extent — from causes directly attributable to wear and tear and for this reason wear and tear depreciation must be accorded some consideration in connection with telephone valuation problems.

The depreciation resulting from age, or physical decay, is a very important factor in connection with telephone valuation work. Even if a telephone plant is maintained in the best possible manner — depreciation resultant from age and physical decay is bound to take place. Iron wires corrode; poles rot; the insulation on cables deteriorates and—even in the case of the central office equipment—wooden parts warp, or decay, in course of time, and metal parts corrode.

From the foregoing it will be obvious that age depreciation—from the telephone standpoint—is far more important than the depreciation resultant from actual use or wear and tear.

Functional depreciation, also, is usually subdivided into two classifications. These classifications are:

(a) Depreciation due to inadequacy.

(b) Depreciation due to obsolescence.

Two excellent examples of inadequacy depreciation may be found in the telephone plant. An engineer, in laying out a cable system plans cables which he feels will be "adequate" to provide telephone facilities for many years to come. Subsequent developments, however, so alter the line requirements that the cables in question are too small—in other words, they are "inadequate."

Another excellent illustration—a telephone switchboard may be installed which, at the time of installation, seems ample to provide telephone requirements for many years to come. For some reason—probably due to the growth factor—this switchboard may become "inadequate" to meet the demands imposed upon it. To complete our illustration, we may assume that—for some reason—additional similar facilities cannot be installed and that the board in question has to be replaced by one of more compact design. The depreciation in this case—as in the case of the cable illustration just cited—may be entirely attributable to "inadequacy."

One of the best definitions of the depreciation resultant from obsolescence is that presented by Mr. Henry Floy in his book, "Valuation of Public Utility Properties." Mr. Floy says "Obsolescence means the depreciation of property through the development of something newer and either more economical or more of a fad. Like inadequacy, it may necessitate the abandonment of property long before it is worn out and in many cases obsolescence depreciation arises largely from the demands of the public. What is obsolete in one place may not be affected by obsolescence in another. Note, for example, the use of the "Pay as You Enter" cars in the larger cities —or the use of "Open-bench" cars in the Borough of Bronx, where they are

considered good practice, while at the same time they are considered obsolete for the Borough of Manhattan—all within the limits of New York City."

Possibly the true significance of obsolescence depreciation may be made clearer by again referring to the illustration of the telephone switchboard. Assume that a certain switchboard is of the magneto type and that it has not depreciated from wear, tear, physical decay or from inadequacy. We may assume further that, although this switchboard is sufficiently large to provide for a reasonable increase in subscriber development, there is a strong public sentiment in favor of the common-battery form of service. It is quite possible that the company could be forced (by popular demand—backed by a State Public Service Commission) to abandon the obsolete magneto board and to replace it with a common-battery board of up-to-date design. The depreciation, or "lessened utility value" would be entirely attributable to obsolescence—in the case under illustration.

We have now considered the definitions of the four usual causes of telephone property depreciation. There is still another class of depreciation, however, which is worthy of serious consideration—the depreciation resultant from unusual or "extraordinary" causes. Such depreciation is termed "extraordinary depreciation." To illustrate the importance of extraordinary depreciation—especially in the Middle West and in some sections of the East—it may be said that entire telephone properties are frequently destroyed by sleet storms, especially when accompanied by heavy wind storms.

Another form of extraordinary depreciation is what may be termed the "fire havoc." A specific illustration resultant from fire loss came to the writer's attention several months ago. In a certain town a large group of subscribers were entirely dependent, for their telephone service, upon a certain pole line which carried a number of large capacity aerial cables. At one point this pole line paralleled a large frame structure which was entirely destroyed by fire. The net result—from the standpoint of the telephone company—was that the poles were burned to the ground and an expensive cable plant damaged beyond repair. The loss was, of course, entirely attributable to extraordinary depreciation.

To further illustrate the co-relation between the various forms of depreciation, the following illustration is cited. This illustration is drawn from industrial practice—due to the fact that the wear and tear phase may be more properly featured.

A certain machine is in daily use and the constant usage causes a rapid depreciation directly attributable to wear and tear.

An exactly similar machine, for some reason, is not used. Despite the fact that it is given good care—and is covered with a tarpaulin—in course of time the second machine will depreciate. The depreciation in this case will be entirely attributable to age or physical decay.

The first machine is designed for an especial purpose and so proportioned as to provide for a definite daily output. It so happens that manufacturing conditions vary in such a way that the "load" upon this machine is more than it can take care of. The load, however, is not great enough to warrant the installation of an additional machine of similar capacity—and hence the machine, cited in the illustration, has to be removed from active service—despite the fact that it is in good physical condition. The depreciation in this case would be entirely attributable to "inadequacy."

We may further assume that the machine in question is of the semi-automatic type—and while it is in good condition physically—and adequate to meet the load requirements—the installation of a full-automatic machine would result in operating economies, and a better product. If this machine were removed—for the reasons cited—the depletion in value would be due to obsolescence.

In ordinary practice—both in the industrial and public utility fields—we must consider all four of these depreciation factors and, frequently, the additional factor of "extraordinary depreciation." It is thought that the foregoing illustration will serve to emphasize the co-relation between the various depreciation factors — and, furthermore, to emphasize the importance of depreciation from the standpoint of "Valuation in Rate Making."

In considering the subject of theoretical depreciation it is most important that the reader should learn, at the outset, to differentiate between **depreciation** as involved in the determination of the **present value** of telephone properties and **depreciation** as involved in the problem of building up a **reserve fund** for replacing plant which is to be retired from active service. Many so-called experts (most of them accountants) make the mistake of confusing these two phases of the depreciation problem. Many court and commission opinions (as well as the opinion of competent legal and engineering experts) could be cited in substantiation of the writer's hypothesis that "present value depreciation" and "reserve fund depreciation" are entirely unrelated.

It is the function of the engineer to inspect a telephone property and to determine its present condition (and hence its present value) giving due weight to wear, tear, age, physical decay, inadequacy and obsolescence. It is also the function of the engineer to determine rates of depreciation—which may be used by the accountant—in building up a depreciation reserve fund.

The accountant's task consists in so applying these depreciation rates as to maintain an adequate depreciation reserve fund and, from time to time, to balance this reserve fund, so that it will neither be inflated nor deflated.

To illustrate the distinction between depreciation from the engineer's standpoint and depreciation from the account's standpoint (and also to illustrate the confusion that may exist between the two) the following example is cited:

A telephone pole has a reproduction cost of $10—and a negligible salvage value. From data as to the average life of telephone poles, of the size and type of the one under consideration, the engineer feels warranted in assigning a ten year life to the pole in the illustration. The difference between the salvage value (in this case zero) and the reproduction, or original, cost is known as the "wearing value." The wearing value is the value that actually passes out of existence during the active life of the item of plant under consideration. In this case—due to the fact that there is no salvage value—the wearing value will be $10. Having determined the wearing value and the average life, the engineer specifies an annual rate of depreciation of 10% per annum. In other words, in accumulating the reserve for depreciation, one-tenth of the wearing value of the pole will be set aside each year—in this case $1.00.

Now let us assume that the pole in question is five years old at the time of appraisement and that the engineer has made a careful inspection—finding the pole to be in very good condition, showing little evidence of depreciation, from wear, tear or age, and no evidence of "lessened utility value" from the standpoint of inadequacy and obsolescence. In other words, from an engineering standpoint the engineer feels justified in assigning a relatively high present value to the pole. In terms of percentage—we may say that this present value is seventy-five.

Now let us see what would happen if the value of this same pole were de-

preciated from a strictly accounting standpoint. The annual rate of depreciation is 10% ($1.00 per year) and the pole is five years old at the date of appraisement. Multiplying the number of years by the rate—per cent of depreciation we have an accumulated deduction of fifty per cent—or $5.00 in this case—and the present value of the pole would be $10.00 less $5.00, or $5.00. In other words, instead of assigning a present value of $7.50 to the pole, the pole would be included in the rate-base valuation at $5.00—25% less than its true worth.

It may seem to the reader that there is an inconsistency between the establishment of a 10% depreciation rate (for accounting puproses) and the assignment of a 25% higher value (than the value determined by the accounting method) for rate making purposes. Despite the seeming inconsistency both practices are correct.

The annual depreciation rate is determined on the basis of observed averages. The average life in this case is found to be ten years—for the type of pole under consideration—and hence the annual depreciation rate is 10%. It so happens that the pole is in excellent condition at the time of appraisement and, very naturally, it is given the benefit of this condition, as found. It may be, however, that depreciation, either from a physical or functional standpoint, will take place more rapidly during the last two and a half years of the life of the pole and that this particular pole will eventually not exceed the average ten year life. Or, it may be, that other poles in the same group will be found—from an actual inspection—to have a present condition of even less than 50%. **The law of averages holds good in the long run**—and if the basic salvage values; average lives, and condition percentages are properly determined by the engineer, the accountant will not go far wrong in basing his annual accretion to the reserve for depreciation upon the rates specified by the engineer.

In Fig. 14 an illustration is presented of the method of determining the annual amount which shall be set aside for depreciation—in a specific case. The total amount of depreciation—as noted at the foot of the sixth column of figures is $56,053. This amount is an allowable deduction in a rate case—from gross earnings in determining the net income. If we divide the net income—as finally determined—by the rate-base value of the property we will have a reliable index as to the reasonableness of the rates applied for. As a matter of fact, this method of procedure is usually employed by State Public Service Commissions in testing rates and in approving valuations.

Referring again to Fig. 14—it will be noted that the accounting classifications (as prescribed by the Interstate Commerce Commission) are shown in the first column. The second column shows the "Classifications of Plant"—Right of Way; Buildings; Central Office Equipment, etc. The reproduction costs of the various property elements are shown in the third column (the first column of figures). In the fourth column we find the "Net Salvage Values"—expressed in terms of percent.

In connection with the net salvage values it will be noted that the items Right of Way; Other Equipment of Central Offices; Exchange Pole Lines; Underground Conduit; Toll Pole Lines; Office Furniture and Fixtures; Stable and Garage Equipment, and Tools and Implements have been assigned a zero salvage value. The reason for this will be obvious in the case of pole lines, right of way and conduit. Especially in the case of the conduit—no matter how much a conduit system may cost, it is impossible to recover a junk or salvage value on it. Some poles—if they are large and in relatively good condition—may have a salvage value. In the case under consideration, however, the poles were in such poor condition that it was cheaper to "forget them" than to try to "prove-in" a salvage value.

Ordinarily, such items as office furniture and fixtures, stable and garage equipment and tools and implements would have salvage values. In the case of the garage equipment (which includes automobiles and trucks) the salvage value is usually relatively high. In the case under consideration, however, it so happened that the equipment involved was in such condition as to warrant a zero salvage value.

Again referring to the "Net Salvage Value" column—it will be noted that a negative salvage value has been assigned to the exchange aerial wire (city and rural). The reason for this was that the wire in question was iron wire—iron wire has a negligible salvage value and it costs a good deal of money to remove it from plant. Hence, the negative salvage value of 15% was assigned. This negative salvage value really represents the cost of removing the iron wire from plant. It will also be noted that the iron toll wire has been assigned a negative salvage value of 15%—for the same reason. In this connection it may be well to note that the copper toll aerial wire has been assigned a relatively high salvage value —35%.

All of the net salvage values—as shown in the column under discussion —represent the gross salvage values less the costs of removal from plant.

The fifth column is entitled "Wearing Value." As previously stated, the wearing value is the value which actually passes out of existence during the useful life of plant. In this case it is expressed in dollars instead of in percentages. The reciprocals of the salvage values, as shown in the fourth column, are applied to the reproduction costs as shown in the third column—the result being the corresponding wearing values as given in the fifth column.

The sixth column is entitled, "Life in Years"—and it represents the results of the engineer's investigation as to the average lives of the various component elements of the telephone plant.

The average lives of certain elements of a telephone property may vary widely according to the individual conditions as found in the case under investigation. Poles, for instance, will have a much longer life in some localities—than in others. The reason for this will be obvious when climatic and soil conditions are taken into consideration.

The seventh column is entitled "Depreciation Per Annum in Percent of Reproduction Cost." The figures presented are practically the reciprocals of the figures presented in the sixth column. In other words, if a certain classification of plant has a ten year it will have a 10% depreciation rate. It will be noted, however, that—to serve the cause of conservatism—the depreciation rates, in some cases, have been reduced slightly below the corresponding reciprocals of the average lives. To illustrate "Account 212 Buildings" is assigned an average life of twenty-five years. Normally the depreciation rate would be the reciprocal of twenty-five—or 4% per annum. In the table, however, it will be noted that 3½% per annum has been used.

The eighth column of figures is entitled "Depreciation in Dollars Per Annum"—and the respective figures are obtained by applying the depreciation rates (as given in the seventh column) to the corresponding wearing values as given in the fifth column. To illustrate—under "Account 222 Other Equipment of Central Offices," the reproduction cost is $682; the annual rate of depreciation is 10% and the depreciation in dollars per annum as given in the eight column is $68.

The ninth column is entitled "Composite Depreciation Percent of Reproduction Cost." The figures presented

in this column are merely for general informative purposes and are obtained by dividing the figures in the eighth column by the corresponding figures in the third column (Reproduction Costs). It will be noted that the composite depreciation rate—as given at the lower right hand corner of the table—is 7.87 per cent. There is ample precedent for the allowance of from 6% to 8% depreciation on the total of the inventoriable property—and it will be noted that Fig. 14 covers the inventorial propery, **only,** and **does not include** any of the collateral costs or non-physical assets.

As a general rule all the items of collateral cost are depreciated at the same rate as the cost of the inventoriable property. The collateral costs, it will be remembered, include the following items:

Engineering and General Supervision during Construction.

General and Legal Expense during Construction.

Taxes and Insurance during Construction.

Interest, on Capital Invested, during Construction.

The collateral costs will be discussed in detail in a subsequent chapter—they are merely listed here to refresh the

DETERMINATION OF ANNUAL DEPRECIATION IN CLUDING DEPRECIATION DUE TO INADEQUACY, OBSOLESCENCE AND MUNICIPAL REQUIREMENTS—BUT NOT FOR EXTRAORDINARY CASUALTIES, SUCH AS: SLEET STORMS, FIRES AND EARTHQUAKES

I. C. S. Acc't No.	Classifications of Plant	Reproduction Costs	Net Salvage Value, Per Cent	Wearing Values	Life in Years	Depreciation Per Annum in % of Repr. Cost	Depr'ciat'n In Dollars Per Annum	Composite Depr'ciat'n % of Repr. Cost
207	Right of Way	$ 8,720.00	.0	$ 8,720.00	18	5.5	$ 480.00	5.5
212	Buildings	9,134.00	12.5	7,992.00	25	3.5	320.00	3.5
220								
221	Central Office Tel. Equip't	73,265.00	17.0	60,810.00	12	7.0	5,129.00	
222	Other Equipment of Central Offices	682.00	.0	682.00	10	10.0	68.00	
	Total 220	73,947.00		61,492.00			5,197.00	8.5
230								
231	Station Aparatus (City)	75,390.00	10.0	67,851.00	10	9.0	6,785.00	
231	Station Apparatus (Rural)	33,002.00	10.0	29,702.00	12	7.5	2,475.00	
232	Station Installation (City)	20,483.00	10.0	18,435.00	8	* 2.5	574.00	
232	Station Installation (Rural)	8,786.00	10.0	7,907.00	8	* 2.5	220.00	
234	Private Branch Exchanges	1,562.00	15.0	1,328.00	10	8.5	133.00	
235	Booths & Special Fittings	941.00	.0	941.00	10	10.0	94.00	
	Total 230	140,164.00		126,164.00			10,281.00	8.1
241	Exchange Pole Lines (City)	95,281.00	.0	95,281.00	12	8.3	7,908.00	
241	Exchange Pole Lines (Rural)	94,699.00	.0	94,699.00	16	6.25	5,919.00	
	Total 241	189,980.00		189,980.00			13,827.00	7.3
242	Exchange Aerial Cable	59,096.00	33.0	39,003.00	16	4.0	2,364.00	4.0
243	Exchange Aerial Wire (City)	44,849.00	15.0	51,576.00	8	14.3	6,413.00	
243	Exchange Aerial Wire (Rural)	55,918.00	15.0	64,306.00	10	11.5	6,431.00	
	Total 243	99,767.00		115,882.00			12,844.00	11.0
244	Exchange Underground Conduit Main	13,998.00	.0	13,998.00	50	2.0	280.00	
244	Exchange Underground Conduit Sub	572.00	.0	572.00	20	5.0	29.00	
	Total 244	14,570.00		14,570.00			309.00	2.1
245	Exchange Underground Cable Main	14,681.00	40.0	8,809.00	33	1.8	264.00	
245	Exchange Underground Cable Sub	2,181.00	30.0	1,527.00	15	4.66	102.00	
	Total 245	16,862.00		10,336.00			366.00	3.5
251	Toll Pole Lines	93,745.00	.0	93,745.00	16	6.25	5,859.00	6.25
253	Toll Aerial Wire (Iron)	17,249.00	15.0	19,836.00	12	9.6	1,656.00	
253	Toll Aerial Wire (Copper)	18,766.00	35.0	12,198.00	25	2.6	488.00	
	Total 253	36,015.00		32,034.00			2,144.00	6.7
256	Toll Submarine Cable	347.00	25.0	260.00	10	7.5	26.00	7.5
261	Office Furniture & Fixtures	4,950.00	.0	4,950.00	10	10.0	495.00	10.0
264	General Stable & Garage Equip't	5,112.00	.0	5,112.00	5	20.0	1,022.00	20.0
265	General Tools & Implements	2,075.00	.0	2,075.00	4	25.0	519.00	25.0
	Total Physical Property (1)	$755,484.00	5.7	$712,315.00	12.7		$56,053.00	7.87

(1) Represents the total as evidenced by the Valuation less Land and Materials & Supplies.

The average Annual Depreciation rate for station installations is 12.5%, assuming that the installations remain in service for their entire life. Owing to disconnection of service by subscribers, many installations are removed and abandoned and charged expense account at the time service is disconnected. It is estimated that about 80% of the installations are treated in this manner. The depreciation rate, therefore, is only applicable to the balance and the rate indicated provides for only 20% of the investment.

Fig. 14

Illustration of Computation of Annual Depreciation for a Telephone Property

reader's mind as to the items included under this caption.

The non-physical assets—it will be remembered—include the following:

Going Value (or Cost of Establishing the Business).

Cost of Financing.

Cost of Franchises.

The non-physical assets, also, will be discussed in detail in a subsequent chapter and are merely mentioned here to refresh the reader's mind as to the items included under this caption—and also for the purpose of calling attention to the fact that the non-physical assets (especially Going Value) are not depreciatable. This fact, naturally, tends to bring down the final composite depreciation rate—as expressed in terms of percentage of reproduction cost. In the case illustrated in Fig. 14, therefore, the final composite depreciation percentage would be appreciably less than 7.87%.

In the November installment the practical application of depreciation to the problem of determining the present condition of the various component elements of a telephone property will be discussed in detail.

Utah Commission Grants Radio System a Permit

Salt Lake City, Utah—Permission has recently been granted by the Public Utilities Commission of Utah to B. W. Dalton to operate a telephone system in San Juan, Grand, Emery, Carbon, Utah and Salt Lake Counties. The permit authorizes the applicant to construct, operate and maintian radio telephone stations to supply communication between the towns of Blanding, Monticello, Moab, Thompson, Sego, Green River, Price, Provo and Salt Lake City. The installation is to be completed within six months of the date of the order. The Midland Telephone Co. entered a protest stating that it proposed to construct a line between Price and Green River, but the protest was overruled as the proposed line had not been constructed and as a showing was made that the radio service to the town mentioned would add to the public convenience, the permit was granted. The first five towns named in the order are located in the sparsely populated and mountainous counties in southeastern Utah and are in some cases at a considerable distance from railroads and other lines of communication. The stations at Price, Provo and Salt Lake City provide an avenue of communication to the state capital.

HELPING THE SERVICE LINE

Missouri Telephone Officials Promote Improvement of Rural Service

St. Louis, Mo.—One of the serious problems of giving good service in many exchanges is the subscriber owned rural line or service line as it is sometimes called. On these lines, the telephone company furnishes switching service only and the lines are built and maintained by the subscribers. Naturally, the maintenance is not first class and the service deteriorates not only on the line itself but also on the exchange to which it is connected.

Officials of the Southwestern Bell Telephone Company in the Western District of Missouri have made a start toward improving the service and the methods employed are described in Southwestern Telephone News.

One of the most successful campaigns for service line improvements was carried out at the Aurora Missouri exchange. The rural lines switched at Aurora were found to be in very unsatisfactory shape. The chief causes of trouble were poor connections, defective ground rods and lightning arresters. The farmer had been accustomed to repairing his telephone line in quite the same way that he repaired a break in his fence; that is, he had, instead of carefully soldering a break in the line, merely twisted the two ends together at the break. Little wonder that transmission was below standard! These poor connections resulted in a decided increase in telephone miles on the line due to the greatly increased resistance at the poor connections. But how was the farmer at Aurora, Missouri, to be shown his error and persuaded to make the needed repairs?

To accomplish the necessary educational work and secure the farmers' co-operation, two "get-together meetings" were held at Aurora. The first meeting was announced by invitation and took the form of a luncheon at which the local and district telephone people were host and hostess and the service line subscribers the invited guests. Practically all service lines were represented at the luncheon. After every one in attendance had been served the Chairman announced the purpose of the luncheon, namely, to discover the causes of poor transmission on the service lines and suggest better methods of repairing the lines where necessary.

A large chart had been prepared by the plant department showing graphically by a solid black line the actual length in miles of each line and by extending the solid black line by a dotted line the farmer was shown the distance his telephone had virtually been removed from the central office due to high resistance resulting from the many poor connections, faulty ground rods and defective lightning arresters. The term "telephone mile" as used in this article means the amount of resistance of one mile of No. 12 iron wire.

A few days later a similar luncheon was held in Aurora. At this second meeting only the agents of the rural lines were invited. The same chart was explained to the line agents and a number of exhibits of faulty connections and equipment taken from the lines were shown and discussed.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

of Telephone Engineer, published monthly at Chicago, Ill., for October 1, 1922.

State of Illinois, County of Cook, ss.

Before me, a notary public, in and for the state and county aforesaid, personally appeared W. H. Graffis, who, having been duly sworn according to law, deposes and says that he is the general manager of Telephone Engineer and that the following is to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, general manager and business manager are:

Publisher, Telephone Engineer, Chicago, Ill.
Editor, Herbert Graffis, Chicago, Ill.
General Manager, W. H. Graffis, Chicago, Ill.
Business Manager, Jos. M. Graffis, Chicago, Ill.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders, owning or holding one percent or more of the total amount of stock):

W. H. Graffis, Herbert Graffis and Jos. M. Graffis, all of 28 E. Jackson Blvd., Chicago, Ill.

3. That the known bondholders, mortgagees and other security holders owning or holding one percent or more of total amount of bonds, mortgages, or other securities are (if there are none, so state).

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustees or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full known and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any person, association or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date above is..... (This information is required from daily publications only).

TELEPHONE ENGINEER,
W. H. Graffis, Gen. Mgr.

Sworn to and subscribed before me this 21st of September, 1922.

(Seal) M. A. STEPHEN.

(My commission expires Sept. 1, 1925.)

OPINIONS AND COMMENTS

ATTEND THE CONVENTION

The Convention of the United States Independent Telephone Association in Chicago which will be held during the present month will, as always, be an important event of the year as far as telephone companies of the independent side of the industry are concerned. At that time telephone men from every state of the Union will meet to consider the larger problems that are facing the telephone business.

State and District Telephone meetings have an important place in the organization of the telephone field, but there are many problems that extend beyond district and state boundaries. These problems naturally come before the national Association, and in order to keep in touch with them, telephone companies must associate themselves with it as well as state and local associations.

While the Association, through the medium of circulars and reports, keeps its members well informed of the matters which come before it, it is at the general meeting that the individual member has the opportunity of expressing his own ideas and conclusions and of hearing others express their views. In this the convention performs a service that no written information furnished by the Association can supply.

Not only does the Convention give this opportunity of hearing the exchange of views, but it provides the opportunity of keeping in touch with the development of the art. Manufacturers and suppliers of telephone equipment and material can afford to present exhibits much more extensive in character than they can show at other meetings. Likewise, many improvements and new ideas in telephone equipment are shown for the first time at the annual meeting of the national Association. A study of the exhibits that are made from year to year is a liberal education in the growth of the telephone.

Another feature of the Convention is the opportunity of meeting old and new friends. Each year there are many gatherings of men who meet only this one time, but among whom have sprung up warm bonds of friendship growing out of an annual getting-together. Recently the meeting of the Independent Telephone Pioneers has added much to this feature.

The larger companies will be well represented. That is a foregone conclusion, but a more liberal representation from smaller companies should be present. The expense of the trip and the stay in the city is, no doubt, one of the causes for the lack of a large number from small companies, but there are certainly many who could and should arrange to go for at least part of the time.

Certainly many who have failed to attend in the past could well do so if they would make the effort. Let's all get together and go to Chicago from October 24 to 27 and make this Convention the greatest that has ever been held.

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CONCERNING EXPERIENCE

Sooner or later everyone must matriculate as a student in the University of Experience. This applies alike to the graduates of colleges or professional schools and to those who leave school as soon as education and child labor laws permit and take jobs in the workshop or on the farm. Unlike other educational institutions, the courses of this university are not arranged so that they can be completed in a fixed number of years. Commencement day arrives only when the student closes his books on the last day of his allotted span of years. It is the higher institution of learning for which all other schools are preparatory departments.

In this school, distinction between student and teacher disappears and each one enrolled must serve both as student and teacher. The success — using the word with the broadest possible meaning — of any individual depends upon how well he can perform both functions. Experience may be classified in two general types, one's own and that of others.

The knowledge of any individual depends upon his ability to organize, interpret and preserve the information that he acquires through his own efforts and that which he receives from others. The limitations of the human intellect are such that a single person, through his unaided effort can accumulate only an infinitesimal fraction of the total of human knowledge. Should he attempt to proceed without reference to the experience of others, not only will the amount of knowledge he can obtain be very small, but there is also the likelihood that he will fall into grave error in classifying and interpreting that which he does obtain.

The man of broadest experience is the man who can acquire and utilize the experience of others. The law that to him who gives

shall be given applies here as in other things. The man who gives freely of his experience — who serves as a teacher in the great University — also receives much from the experience of others. In his effort to increase the knowledge of others he is increasing his own knowledge. Ultimately he will reach the proud distinction of being "He Who Knows," which is one of the highest distinctions that the University can bestow.

Applying this to the telephone industry, the worker who will progress must obtain and utilize the experience of others in the field and must give freely of his own knowledge. He must overcome the natural isolation of the telephone man whether it be the isolation of the telephone worker in the small community where he is the only one of his kind or the isolation that arises from specialized work in a large organization. He must establish contact with what is being done in other places or in other departments than his own specialty. The channels through which this contact may be established are the meetings and conferences that are being held by those interested in the business and through reading the technical journals. Meetings are held frequently enough and are distributed geographically so that nearly everyone may at one time or another have the opportunity of attending. There is no one who cannot find the time or has the means to read one or more technical journals. Each one who earns a livelihood by telephone work owes it to himself and to the industry to utilize these means of extending his own experience and that of others to the greatest possible extent.

FROM FAD TO FACTOR IN UTAH PHONING

The first occasion that has come to our notice where a public utilities commission has been asked to grant a permit for the operation of a radio telephone system is the Utah case reported on another page. The Commission found that the public convenience and necessity will be served by the establishment of the system and therefore granted the permit.

We are not advised definitely that there are no wire lines in existence between the various towns on the proposed system, but as far as we are able to learn, they are in operation only between the three larger cities which constitute the extension of the system to the state capitol. There was also a proposed line between two other points which had not been constructed. Apparently the major part of the system will cover territory where no wire telephone service is available.

If the proposed system is installed, telephone men will watch reports of its operation with considerable interest, as it is the first case where a network of more than two radio telephone stations is to be placed in use for other than military service.

THE STORY OF FORT WAYNE

On another page is presented a story of recent telephone developments in Fort Wayne, Indiana. Here was a telephone company which seemed to have accumulated all of the ills that it would be possible to find in a locally owned property. Dissatisfied employes, a disgruntled public, opposition by city authorities, insufficient revenue, obsolete plant, inadequate facilities, all contributed toward making the operation of the property anything but a joyful occupation. Undismayed, the management started out to correct conditions and step by step it has been overcoming the obstacles and the property is now well on the way to recovery.

Many other properties have one or more of the problems that confronted Fort Wayne and the managements have not in all cases been able to find the way out. They should be able to profit by Fort Wayne's example. What can be done in Fort Wayne can be done in other places. An earnest desire to give good service, an intelligent survey of conditions and the courageous application of correctives will solve any of the present day problems of telephone operation.

GIVING THE HALF-HEARTED "THE BIRD"

Much profound philosophy has been handed all of us about the perversity of mankind.

A man will wail for relief from his oppressors and then give his rescuers indifferent gratitude or act in the manner of the woman reported as asking the life-saver who had hauled her young Izzy from threatened death in the briny deep, "Vell, mister, vere is de boy's new hat?"

Jay Mitchell relates a few hot paragraphs on this subject that were written with reverse English in the Atlanta Retail Grocer. The Southern student of business writes:

"How To Kill an Association"

"Don't come.

If you do come, come late.

If too wet or too dry, too hot or too cold, don't think of coming.

Kick, if you are not appointed on a committee, and if you are appointed, never attend a committee meeting.

Don't have anything to say when you are called upon.

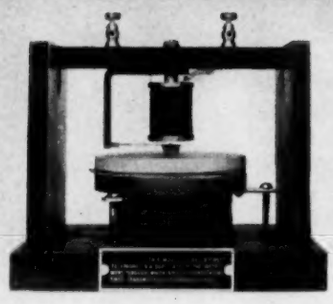
If you attend a meeting, find fault with the proceedings and work done by other members.

Hold back your dues, or don't pay them at all.

Never bring a friend who you think might join the Association.

Don't do anything more than you can possibly help to further the Association's interests; then when a few take off their coats and do things, howl that the Association is run by a clique."

The secretary of the Illinois Association adds a comment on conditions that call for every telephone man to jump into the trenches with his state and national associations. Mitchell says: "The telephone companies never faced a situation in which it was so necessary for them to co-operate as they do at the present time. Each operating company is dependent in a great many ways upon its neighbors, and the success of the entire industry, including the operating companies and the manufacturers, is so inextricably interwoven that half-hearted co-operation becomes a source of damage and danger."



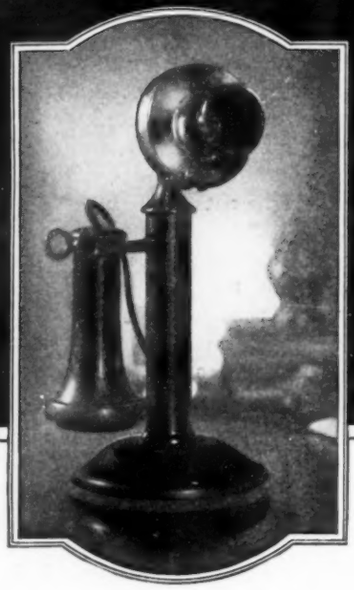
1875 A duplicate of Alexander Graham Bell's first telephone.

1877 Bell's Box Telephone, used both as transmitter and receiver. This instrument, demonstrated by the inventor in his early lectures, became the first commercial type of telephone.

1886 One of the instruments through which our fathers talked.

1898 This year marked an important change in telephone design.

1900 The type of telephone used during Roosevelt's first term.



From Bell's first model to the telephone now in use

Your telephone, then and now

Since the time, forty-odd years ago, when the telephone was recognized as a commercial possibility, the Western Electric Company has been a maker of telephones.

This long experience has enabled us constantly to improve your telephone and to make it a marvel of mechanical and electrical precision, sensitive to the subtle differences in inflection of your voice. Yet with all its accuracy, the telephone must be manufactured economically and in great quantities to meet the demands of a growing telephone system.

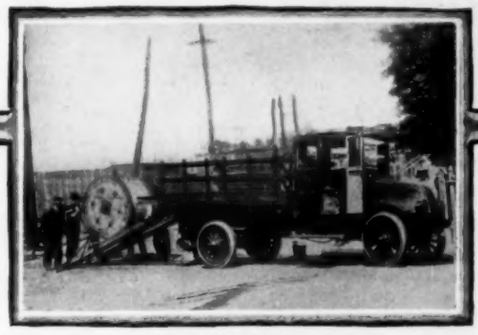
In finding the solution to this problem, Western Electric has helped make possible the quicker, more efficient, more intimate life of the nation today.

Western Electric

Since 1869 Makers of Electrical Equipment

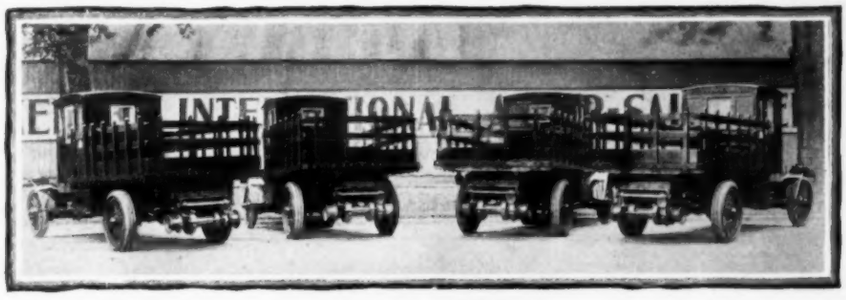
BEST FOR CABLE-HAULING!

PULLING CABLE



LOADING REEL

THE BELL TELEPHONE COMPANY OF CANADA, LIMITED, AFTER EXHAUSTIVE TESTS ON THE ABOVE OUTFIT, ADD



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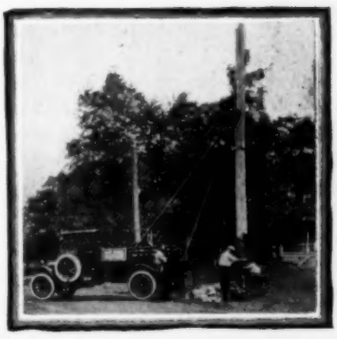

MEAD-MORRISON WINCHES *and pole-setting for cable-hauling*

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Reliable Sleeves For Perfect Splicing

Copper—Tinned Cooper—Tinned Steel

(A. T. & T. STANDARD)

Line Wire Sleeve before twisting — Line Wire Sleeve after twisting

The strength and transmission efficiency of your lines are largely dependent on the strength of the splices. The best guarantee for satisfactory service you can have is RELIABLE SLEEVES.

RELIABLE SLEEVES are made and inspected to comply with the standard specifications of the largest telephone and telegraph companies.

Every sleeve that is shipped from our factory is guaranteed to pass inspection under these most exacting specifications.

RELIABLE COPPER SLEEVES have ample length and strength to assure splices as strong as the line itself, and moreover make a low resistance splice.

The "Rust Resisting Qualities" of RELIABLE TINNED STEEL SLEEVES far surpass any others, because of perfected methods of manufacture, which insure a "heavy" and "uniform" coating of tin.

A TEST WILL PROVE IT!

Reliable Electric Company

3145 Carroll Avenue CHICAGO, U. S. A.

BOOK REVIEW

"Telephony," by McMeen and Miller; published by the American Technical Society, Chicago; $5.50 (by mail, $5.70).

The long expected revision of this comprehensive text book has at last arrived. The first edition published in 1912 has been out of print for some time, leaving the telephone field without a single book covering the entire field. The present edition has been revised by Charles W. McKay, with the exception of certain chapters revised by Jay G. Mitchell and many additions and revisions by Ralph T. Williams. The new edition is somewhat smaller in size of page than the earlier edition and is bound in flexible covers. There are over 900 pages of text divided into 50 chapters. Nearly every chapter shows signs of the revision and much new material is added amounting in many cases to rewriting entire chapters. A new introduction has been written and the earlier chapters on telephone systems and apparatus have been brought up to date by the description of new types. A new chapter describing "super-service" common battery switchboards has been added while the chapters on automatic switchboards now describe the two-wire type and the panel type. Chapters describing types now obsolete have been omitted.

Of interest to telephone engineers are the sections that have been added to the chapter on power plants on the selection of power plant equipment and the chapter on the transcontinental line. Many readers will probably wish that more complete details of the telephone repeater and something along the line of telephone transmission measurement had been included but the authors undoubtedly were compelled to omit much by reason of limitation of space.

The chapter on engineering gives a brief discussion of the development study and fundamental plan and gives suggestions for planning the distribution system. The chapter on testing adds a new feature by giving typical circuits of testing desks and outlines the uses of the various keys. A complete index is of much assistance in locating the individual topics.

U. S. Telephone Calls in 1922 Seven for Everyone on Earth

New York City.—Dr. Hawthorne Daniel, in the World's Work says, "If the telephone calls that were put in last year in the United States alone had been scattered evenly about the earth, every person in every country would have been seven times to the phone—every one of India's troubled millions, of China's and of Africa's, and of every other land. The wire used in the United States would span the distance to the moon a hundred times—would circle the world a thousand. The army and navy of the United States together number about the same as the employes of the Bell Telephone system.

J. W. Johnston, Stromberg-Carlson Founder, Dies at Los Angeles

Los Angeles, Cal.—J. W. Johnston, pioneer resident of Chicago, and one of the founders of the Stromberg-Carlson Telephone Mfg. Co., died here at the age of 81. He came to Chicago from Scotland when a boy and first achieved commercial success in a wholesale grocery business, which was burned out by the Chicago fire.

Chicago, Ill.—The Bell System is required to provide approximately $215,000,000 each year for additions and replacement. It is more than most European nations spent annually for public purposes before the war. It is two and one-half times the annual expenditure of the United States government the year before the Civil War, and it is more than the annual pre-war expense of Spain, Brazil, Argentina or Canada.

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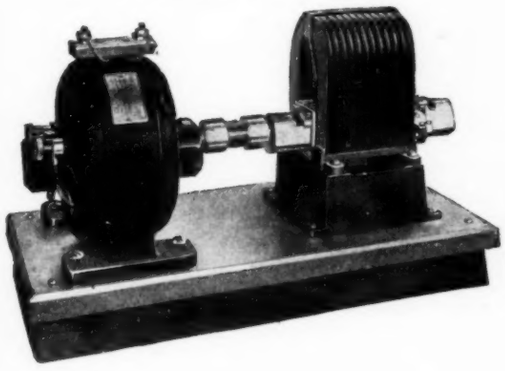
VITRIFIED, GLAZED, CLAY CONDUIT

We carry large stocks of round singles, square single, two, three, four, six and nine duct, in standard and short lengths, splits, mitres and bends.

SERVICE and QUALITY
GUARANTEED

THE CLAY PRODUCTS CO.
BRAZIL, INDIANA

Let Us Solve Your Ringing Problems



Have you heavily loaded farm lines, or other special conditions which affect your ringing? And is your ringing device best fitted for your particular conditions?

We have a force of engineers who will determine this without additional charge, and select the proper machine for you.

Write us about your ringing troubles.

The Holtzer-Cabot Electric Co.

Boston Detroit Philadelphia Baltimore
Chicago New York Minneapolis

COLUMBIA Gray Label Batteries for telephones are alive, of course. They seem almost human, too. Columbias just seem to know it's time to whoop 'er up the instant the receiver's off the hook. Then when the shoutin's over, they seem to know they must rest completely, and they snooze away till next time. That's the way they save their strength for actual work; it's why they work so hard and last so long; it's why telephone men continue to specify Columbia Gray Labels. Fahnestock Spring Clip Binding Posts at no extra cost.

NATIONAL CARBON CO.
Incorporated
LONG ISLAND CITY, N. Y.
Atlanta Chicago Cleveland Kansas City San Francisco
Canadian National Carbon Co., Limited, Toronto

Columbia
Telephone Batteries
"less cost per month of service"

War Department Has World's Largest P.B.X. System

Washington, D. C.—The largest private telephone branch in the world is the one which serves the expanding needs of the war department. On July 1 this branch served 3,178 extensions; on August 1, 3,626. It requires 126 trunk lines for incoming calls; 76 for outgoing calls, local and suburban toll; seventeen private toll lines to New York, Philadelphia, Baltimore, Detroit via Cleveland, Hoboken and Newport News, and 105 tie lines to other government stations in Washington.

Canadian Bell Has 25 Million Extension Budget

Montreal, Que.—In the next five years the Canadian Bell plans to spend about $25,000,000 to overtake demands for services and new switchboards that could not be undertaken in the last five or six years. In Toronto alone more than $12,000,000 will be expended in that period. New stock and bond issues will be necessary.

A. W. Kendall, formerly of Omaha, has been appointed manager for the Kansas City Long Distance Telephone Co., at Richmond, Mo.

Dual-Range, Four-Pole Radio Head Set from Detroit Company

Detroit, Mich.—The Penberthy Injector Co., a well-known maker of engineering specialties, has developed a dual-range, four-pole phone for use in radio work. The following advantages are claimed for the development: Especially sensitive to weakest signals; true tonal reproduction under varying conditions; eliminates to a large extent tube noises and strays; stands highest amplifications without distortion of sound while operating at highest efficiency; high tension insulation between case and windings; a flexible range of ohmic resistance which makes this head set adaptable to any type receiving set; very light and easily adjusted on the head.

Reduced Cost of Hauling, Subject of New Booklet

Detroit, Mich.—Telephone company executives concerned with reducing haulage costs will find a new catalog on General Motors Trucks and Detroit Motor Truck Trailers replete with practical information. The booklet is issued jointly by the two manufacturers.

Easy Leader of "Six Best Sellers" Is 'Phone Book

New York City.—There are approximately 2,500 different directories published on an average of twice annually by the Bell system. This necessitates the printing of about 17,716,000 copies. The paper used weighs 41,725,000 pounds and represents an annual cost of $1,922,575. To haul this paper from the mills to the print shops requires about 834 freight cars of 50,000 pounds capacity. This would make 14 solid trainloads of 60 cars each. There are approximately 26,053,700 lines of subscribers' listings and advertising to be cared for during a period of one year. If it were possible to make up one four-column book, this book would contain 53,390 pages 9 inches by 11 inches, and would be 72 inches thick. The direct expense to all the Bell companies in connection with these directories is $8,134,750, but they have a credit in the form of advertising which reduces the net cost to $3,162,850.

Memphis, Tenn.—Oscar Evans, formerly in charge of the Cumberland's interests at Jackson, Tenn., has been made manager of the Cumberland at Memphis.

A buying revival begins at the

INDEPENDENT CONVENTION

Telephone Engineer Advertising

Tells your story to the men who will do the buying

Write for Advertising Rates
TELEPHONE ENGINEER
28 E. JACKSON BLVD.
CHICAGO

Dependable Since June 1st, 1904

RUNZEL-LENZ ELECTRIC MFG. CO.

Specialists in Manufacture of:
Switchboard and Operators' Cords
Receiver and Desk Set Cords
Transmitter Cords
Radio and Wireless Receiver Cords
CABLES
for Switchboard and Inter-Phone Systems—both Braided and Lead-Covered Types
WIRE
Interior Telephone Wire
Flame-Proof Jumper Wire
Switchboard Wire
Cotton Sleeving

CATALOG SENT ON REQUEST

Runzel-Lenz Electric Manufacturing Co.
1751-57 North Western Ave., CHICAGO

OUR NEW HOME

Equipped With Every Modern Facility for the Manufacture of the Highest Grade of Electrical Measuring Instruments

Indicating Rail Bond Testers—Ohmmeters, Test Sets, Galvanometers, Etc.

Put your testing and measuring problems up to our engineering department

Thompson-Levering Company

57th St. and Westminster Ave., Philadelphia, Pa.

Central Agent
The J. W. Murphy Co., 108 So. La Salle St., Chicago
Pacific Coast Agent
King Knight Company, Underwood Bldg., San Francisco, Cal.

DIAMOND EXPANSION BOLT Co

90 West St. ◇ New York

MANUFACTURERS

Expansion Bolts — Drills
Screw Anchors — Toggle Bolts
Cable Clamps — Bridle Rings
Duct Rods — Guy Clamps

GALVANIZING

PLANT - GARWOOD, N. J.

DISTRIBUTORS

Western Electric Company

INCORPORATED

Note Protection at Corners

Blake Insulated Staples

Unequalled for telephone and bell wiring. The fiber insulation prevents troublesome short circuits and grounds. 4 sizes. Pat. Nov., 1900. Write for samples.

Blake Signal & Mfg. Co.

BOSTON, MASS.

YAGER'S

Trade-Mark Registered

Soldering Salts

Buy it of your jobber in ½-lb., 1-lb. and 5-lb. blue and white enameled cans and 50-lb. cans. New prices for 1922.

Alex R. Benson Co., Inc., Hudson, N. Y.

PARANITE

RUBBER COVERED TELEPHONE WIRES

for every conceivable use. Braided, Leaded and Iron Armored Telephone Cables, Conductors straightway or paired

Manufactured by

Indiana Rubber and Insulated Wire Co.

JONESBORO, INDIANA

PEERLESS

Automatic Water Stills

Absolutely pure water for less than one or two cents a gallon, no matter how polluted your supply of water may be. For drinking, chemical or battery purposes the Peerless stills give you the best, ample supply at lowest cost.
Operated without attention other than occasional cleaning.

Write for complete details

SPARTA MFG. CO.

111 S. Hill Street South Bend, Ind.

STANDARD

This name applied to telephone wires and cables means what "Sterling" does when applied to silver—a guarantee of quality recognized by all discriminating buyers. We will appreciate an opportunity to demonstrate STANDARD Quality.

Write Our Nearest Office

STANDARD UNDERGROUND CABLE COMPANY

Boston Philadelphia St. Louis Washington
Detroit New York Chicago
San Francisco Pittsburgh

For Canada
Standard Underground Cable Co., of Can., Ltd.
Hamilton, Ontario

WIRE TABLES (HH—25—XX 20)
INSULATED MAGNET WIRE

ENAMELED INSULATION. The following table gives the properties of the small enameled magnet wire commonly used in telephone, ignition, and similar coil winding. It represents average practice.

ENAMELED MAGNET WIRE

B & S Gauge	Bare Wire Diam. Ins.	Outside Diam. Ins.	Lbs. per 1000 ft.	Feet per Pound	Ohms per Pound	Turns per Sq. In.
20	.03196	.0338	3.135	319.0	3.239	852
21	.02846	.0302	2.490	401.6	5.138	1065
22	.02535	.0269	1.970	507.6	8.186	1340
23	.02257	.0241	1.565	639.0	12.97	1665
24	.02010	.0215	1.245	803.8	20.60	2100
25	.01790	.0192	.9880	1012.	32.70	2630
26	.01594	.0171	.7845	1275.	51.95	3320
27	.01420	.0153	.6220	1607.	82.55	4145
28	.01264	.0136	.4940	2004.	131.2	5250
29	.01126	.0122	.3915	2554.	208.7	6510
30	.01003	.0108	.3105	3221.	331.5	8175
31	.008928	.0097	.2465	4057.	526.5	10299
32	.007950	.0087	.1960	5102.	836.5	12650
33	.007080	.0078	.1550	6452.	1332.	16200
34	.006305	.0069	.1230	8130.	2118.	19950
35	.005615	.0062	.0980	10204.	3352.	25000
36	.005000	.0055	.0776	12887.	5340.	31700
37	.004453	.0049	.0616	16238.	8480.	39600
38	.003965	.0044	.0488	20492.	13490.	49100
39	.003531	.0039	.0387	25840.	21450.	62600
40	.003145	.0035	.0307	32573.	34100.	77600

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WIRE TABLES (HH—25—15)
INSULATED MAGNET WIRE

SINGLE SILK (S. S. C.) COVERED MAGNET WIRE: The single silk covered magnet wire given in the table below is compiled from a number of sources and will be found to represent a good average practice:

SINGLE SILK INSULATION

B & S Gauge	Bare Wire Diam. Ins.	Outside Diam. Ins.	Lbs. per 1000 ft.	Ohms per 1000 ft.	Ohms per Pound	Turns per Sq. In.
20	.03196	.0340	3.132	10.14	3.235	848
21	.02846	.0305	2.488	12.78	5.140	1055
22	.02535	.0273	1.976	16.12	8.150	1315
23	.02257	.0246	1.570	20.32	12.94	1620
24	.02010	.0221	1.247	25.63	20.58	2010
25	.01790	.0199	.994	32.31	32.58	2470
26	.01594	.0179	.7905	40.75	51.50	3005
27	.01420	.0162	.6280	51.38	81.75	3680
28	.01264	.0146	.4980	64.79	129.6	4600
29	.01126	.0133	.3970	81.70	205.8	5530
30	.01003	.0120	.3160	103.0	326.0	6810
31	.008928	.0109	.2517	129.9	517.0	8260
32	.007950	.00995	.2100	163.8	816.0	9870
33	.007080	.00908	.1611	206.6	1280.	11850
34	.006305	.00830	.1290	260.5	2020.	14250
35	.005616	.00761	.1035	328.4	3175.	16800
36	.005000	.00700	.0823	414.2	5035.	19850
37	.004965	.00645	.0663	522.2	7885.	23300
38	.004453	.00596	.0534	658.5	12350.	27300
39	.003531	.00553	.0424	830.4	19550.	31700
40	.003145	.00514	.0345	1047.0	31500.	36700

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CONSTRUCTION TOOLS AND SPECIALTIES

REELS, SHOVELS, DIGGING BARS, TORCHES, FURNACES, PLIERS, LEATHER GOODS, AND CABLE TOOLS

Prices on request.
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PAUL W. HERBST
404 N. WELLS ST.
CHICAGO

Douglas Fir Cross Arms

We manufacture all sizes of Douglas Fir Cross Arms. Write us for prices.

Foster-Wyman Lumber Co.
1034 Henry Bldg. Seattle, Wash.

A handy rope-pull type
BARTLETT
COMPOUND LEVER
TREE TRIMMER

This special type developed for the Western Electric Co. has the easy cutting qualities of the famous Bartlett No. 1 tree trimmer.

It is insulated; operated by a rope-pull and a 14 inch pull lever which increases the cutting power; and is supplied with two additional four foot sections so it may be extended as long as 16 feet. Each tool guaranteed.

Bartlett Tree Trimmers are standard with leading telephone and telegraph companies.

Write for full particulars.

BARTLETT MFG. CO.
452 East Lafayette Ave.
DETROIT, MICH.

STEPHENS
CLIMBERS

Straps, Belts and Safetys

W. H. BUCKINGHAM
BINGHAMTON, N. Y.

Charles W. McKay
Rate and Valuation
ENGINEER
1015, 172 W. Jackson Blvd.
CHICAGO

A PRACTICAL TELEPHONE ENGINEER desires to connect with some progressive Independent Company. I have 24 years' experience, starting as Messenger, Lineman, Foreman, Switchboard Man, Manager District Plant, Chief Engineer. Will consider any good, permanent location. Address: EXPERIENCE, care of **Telephone Engineer**, 28 E. Jackson, Chicago.

POSITION WANTED—As Telephone Engineer by graduate electrical engineer of eighteen years' practical experience in Central Office Exchange and Toll Construction and Maintenance, Engineering, Cost Studies and Valuations, Transmission, Commercial Surveys and Fundamental Plan Studies, Traffic and Commercial Departments. Record and personality will stand strictest investigation. Address: "GRAD," care of **TELEPHONE ENGINEER**, 28 E. Jackson, Chicago.

SALESMAN WANTED!—Capable man for P. A. X. sales work. Experienced salesman preferred. **The North Electric Mfg. Co., Galion, Ohio.**

'Twas

"A Hot Time In the Old Town"

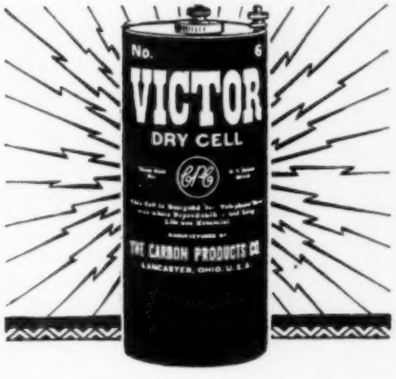
when

FIRE GOT US!

But We're Coming Back and We're Coming Back Strong

ALTHOUGH we were downed for the count of nine when fire completely destroyed our plant, Sept. 24th, 1922, we are already up and at 'em, having acquired a larger plant that will be equipped with improved facilities and the most up-to-date machinery. Our warehouse stock will supply a limited demand. In the meantime we will appreciate it if our customers bear with us and send all inquiries and other correspondence to us in the usual manner.

Victor Telephone Batteries



Fire may have destroyed our plant, but the CPC spirit, prestige and knowledge of battery and carbon manufacture remains imperishable.

THE CARBON PRODUCTS CO.
LANCASTER, OHIO

INDUSTRIAL MANAGEMENT (ZZ—20—16)

CLASSES OF ORGANIZATION

TAYLOR DIFFERENTIAL PIECE-RATE SYSTEM. In this system of compensation the worker receives a certain rate for each piece produced below a certain fixed minimum standard. A much higher rate of compensation is given when his rate of production exceeds the standard rate. In the Taylor system the day wage is not assured to the worker as in other bonus system, and there is no minimum except that minimum fixed by his own efforts.

EMERSON SYSTEM. As before explained, the military organization of everyday practice is supplemented by a staff of departmental experts in the Emerson system. In general, the same ends are sought as with the Taylor system, but instead of information being conveyed to the shop through the four intimate functionaries of the Taylor sytem, it is conveyed through a line organization which savors somewhat of the old military system. Certain principles of guidance, however, make a marked change from the conduct of the older system.

Payment under the Emerson plan assures the workman that he will receive a daily wage no matter what his production may be. As soon as he attains a production of 66.6 per cent of the standard set, he begins to receive a small bonus, which increases rapidly with an increase in the percentage of the efficiency. This rate of increase in payment is very rapid, increasing from one per cent of the wages when the production is 66.6 per cent of the standard rate, to a bonus of 60 per cent when the production efficiency is 140 per cent, or 40 per cent over the standard rate. From this we see that the rate of payment is greater than the rate of efficiency or production increase, the worker being more valuable as his production increases.

BONUS WAGE SYSTEMS. These special wage systems are in general designed to obtain the co-operation of the worker, and by paying additional amounts when the production is above a certain fixed standard, to increase the production without corresponding increases in equipment, buildings and cost of supervision. It is very evident that increasing the production of one man 100 per cent is more economical than employing two men for the reason that two men require more equipment, floor space, supervision, etc. The great difficulty, however, in introducing such systems is to convince the workers that they are really profiting by the change and that it is not simply a "Framed" up affair to gain increased production at their expense. The bonus system that wins in the long run is the one that can be thoroughly understood by the worker and in which he can be made to have confidence.

There are many bonus systems or "differential piece rate" systems in use, but among the most known are the Taylor, Emerson, Gannt, Halsey, Diemer, etc. The Taylor and Emerson systems have already been outlined. In the Gannt "Task-and-bonus plan" a definite time is given for the performance of each task. If this task is completed within the allotted time he is given a bonus in the form of an extra time allowance, ranging from 25 to 50 per cent. Should he fail to accomplish the task within the time limits set, the management guarantee that he will still receive his day's pay.

In the "Premium" system devised by F. A. Halsey, the workman receives his hourly rate and in addition receives a bonus on each task completed within the standard time. A further development of this system is that of paying the foreman a differential bonus which varies with the number of men receiving bonus in his department. Halsey is insistent that the hourly wage rate be made the basis of bonus adjustment, since he claims that time-payment is the unit upon which all payment depends. The Halsey system is best adapted to industries which have already had experience with piece-rate systems and where the workers are already familiar with the general proposition of bonus systems.

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COMPILED BY
J. B. RATHBUN

INDUSTRIAL MANAGEMENT (ZZ—20—15)

CLASSES OF ORGANIZATION

GENERAL NOTES. With the usual form of organization the workers are under the charge of foremen who transmit the necessary instructions and exercise a general supervision of the work, and also of the methods employed in production. The foremen receive orders from the superintendents who in turn report to the general manager, this arrangement being of a military order so far as the graduation of authority is concerned. The traditional class of organization while by far the most commonly employed has many objectionable features, and improvements are possible in management which will result in greater economy of production.

One of the first improvements in industrial management was advanced by Dr. Frederick W. Taylor (1903), who substituted what is known as a "Functional" organization for the older and more common military system. In this arrangement Dr. Taylor replaced the foremen and superintendents by eight "Functional Officials," each of whom came into contact with the individual workmen, and directly exercised authority over them within certain well defined limits. Sometime later Harrington Emerson introduced a system in which the military system was supplemented by a staff of "Counselors," the latter being made up of departmental experts. These two systems are the earliest attempts to reform certain gross errors that are always in evidence with the military system. Since that time many others have planned and introduced more or less successful systems, all of which can be included under the generic title of "Scientific Management."

Confining our attention for the time being to the Taylor and Emerson systems, we will give a short sketch of their practical application. The first will be the outline of the Taylor system of planning routine, the management of the production department, the Taylor Differential Piece-rate System, etc.

ESSENTIALS OF TAYLOR SYSTEM. In this system, the orders from the planning department are carried out in the shop by four functional foremen known as the "Gang Boss," the "Speed Boss," the "Repair Boss," and the "Inspector." In large establishments each of these functionaries may be aided by assistants. The gang boss has control of the materials, tools, fixtures and other production supplies and issues them to the men as needed, and also sees to the removal of the finished pieces after they have passed inspection. The gang boss receives his orders from the planning department in the form of charts and route sheets.

The speed boss is really an instructor and supervisor of operations and methods. He sees that the product is in accordance with the specifications and instructs the workers in the proper handling of the work so that it may be accomplished within the allotted time. The repair boss keeps all machinery and other equipment in proper running order, supervising the cleaning, lubrication, repair and installation. The inspector, as is usual, determines whether the finished product is within the prescribed limits of accuracy, finish, etc., and has the power to accept or reject the finished product. In case of dispute, an official known as the "Disciplinarian" is appealed to, this official being a member of the planning staff and without direct powers of supervision in the shop.

The planning department is related to the accomplishment of production from the performance of the work. This department decides when and how the work is to be done. In general, this covers the routing plan by which the material is carried through the shop, it specifies the machines which are to be employed on the job and also the men who are to do the work. Guided by systematized reports from the shop, the planning department is enabled to make suitable changes in the routing so as to reduce the idle time of men and machinery. Every job given to a worker is accompanied by an instruction card prepared by the planning department which not only describes the job itself but also regulates the choice of tools and fixtures, specifies the cutting speeds, and other items of a similar nature which determine the grade and speed of production. On these cards, as a stimulus to the worker, is given the extra compensation that is to be paid should he perform the work within the specified time. All of this data, of course, is the result of investigations and time study.

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